Digital RoamAbout Access Point

Owner's Manual

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FCC Notice – Class A Computing Device

This equipment generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of part 15 of FCC Rules, which are designed to provide reasonable protection against such radio frequency interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference; in which case, measures taken to correct the interference are at the user's expense.

CE NOTICE – Class A Computing Device:
Warning!
This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Achtung!
Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Attention!
Ceci est un produit de Classe A. Dans un environment domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.

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Preface

The Digital RoamAbout Access Point™ is a 2-port transparent bridge that connects a wired Ethernet (ThinWire™ or 10BaseT) local area network (LAN) and a wireless LAN. The Personal Computer Memory Card International Association (PCMCIA) Type II interface in the access point supports the Digital RoamAbout PC Card Network Adapter™, a radio frequency device, and other approved PCMCIA (also referred to herein as PC Card) wireless network adapters.

Purpose

This manual describes how to install and configure Digital RoamAbout Access Point. It also describes how to perform problem solving for problems that may arise during installation or operation.

Intended Audience

This manual is intended for the device installer and network manager. This manual assumes that you have a working knowledge of local area networking and bridging functions.

Terminology

The following terms are used throughout this manual. You should be familiar with these terms before you continue.

Term	Definition
Digital RoamAbout Access Point	A 2-port transparent bridge that connects a wireless LAN to a wired Ethernet LAN.
Digital RoamAbout PC Card Network Adapter	A PC Card network adapter, consisting of a radio module and a PC Card, that installs in a Digital RoamAbout Access Point or laptop PC to provide wireless connectivity in a LAN environment. Also referred to in this manual as a network adapter.
wireless LAN	A collection of end-user systems connected together using a medium such as radio frequency or infrared technology.
PCMCIA	Personal Computer Memory Card International Association (PCMCIA), which is a standards body for mobile computing peripherals.
mobile end station (MES)	Any portable computer such as a mobile PC, laptop, notebook, or PDA that uses a wireless network adapter for LAN connectivity.
radio module	A wireless network adapter component that consists of an antenna and radio circuitry.
PC Card	A wireless network adapter component, using PCMCIA standards, that provides the digital interface between the host and the radio module.

Conventions

This manual uses the following conventions:

Convention	Meaning
`Courier type`	This special type indicates system output or user input.
[Return]	Refers to a key on the keyboard. For example, [Return] is the Return key and [Tab] indicates the Tab key.
Ctrl/*X*	Hold down the Control key and simultaneously press the key specified by X.
UPPERCASE	Uppercase letters in command lines indicate keywords that must be entered. You can enter keywords in either uppercase or lowercase.
Note	Provides special information about the current topic.

Associated Documents

Contact your Digital reseller or Digital representative for additional copies of this documentation.

The following documents are also available to help you install, operate, and better understand your Digital RoamAbout Access Point:

Digital RoamAbout PC Card Network Adapter Owner's Manual

This manual explains how to install, configure, and troubleshoot the Digital RoamAbout PC Card Network Adapter™.

Bridge and Extended LAN Reference

This guide explains how bridges are used to create extended local area networks (LANs). The descriptions include information about bridges in extended LAN configurations, LAN interconnections, overall bridge operation, spanning tree bridge management, and problem solving.

1

Introducing Digital RoamAbout Access Point

This chapter provides an overview of Digital RoamAbout Access Point and its operation, and includes product specifications.

1.1 Introduction

The Digital RoamAbout Access Point (also referred to in this manual as Access Point or AP) connects a mobile end station (MES) or desktop PC to a wired Ethernet Local Area Network (LAN). An example of a mobile end station is a portable PC, such as a laptop or notebook computer. Typically, a single AP is used to enable several portable PCs (forming a wireless network) to connect to a wired Ethernet LAN.

The AP is a 2-port transparent bridge. One port connects the unit to an Ethernet LAN by means of a 10BaseT or ThinWire cable, or through a DEChub 900 MultiSwitch or DEChub 90 Ethernet backplane. The other port connects the unit to the wireless network through a Digital RoamAbout PC Card Network Adapter (also referred to in this manual as a network adapter).

When equipped with the network adapter, the AP is fully operational with any MES equipped with a similar Direct Sequence (DS) or Frequency Hopping (FH) Network Adapter and also with any PC equipped with the appropriate Digital RoamAbout Network Interface Card (NIC), Direct Sequence/Industry Standard Architecture (DS/ISA) or Frequency Hopping/Industry Standard Architecture (FH/ISA) option.

The Access Point module is shown in Figure 1–1.

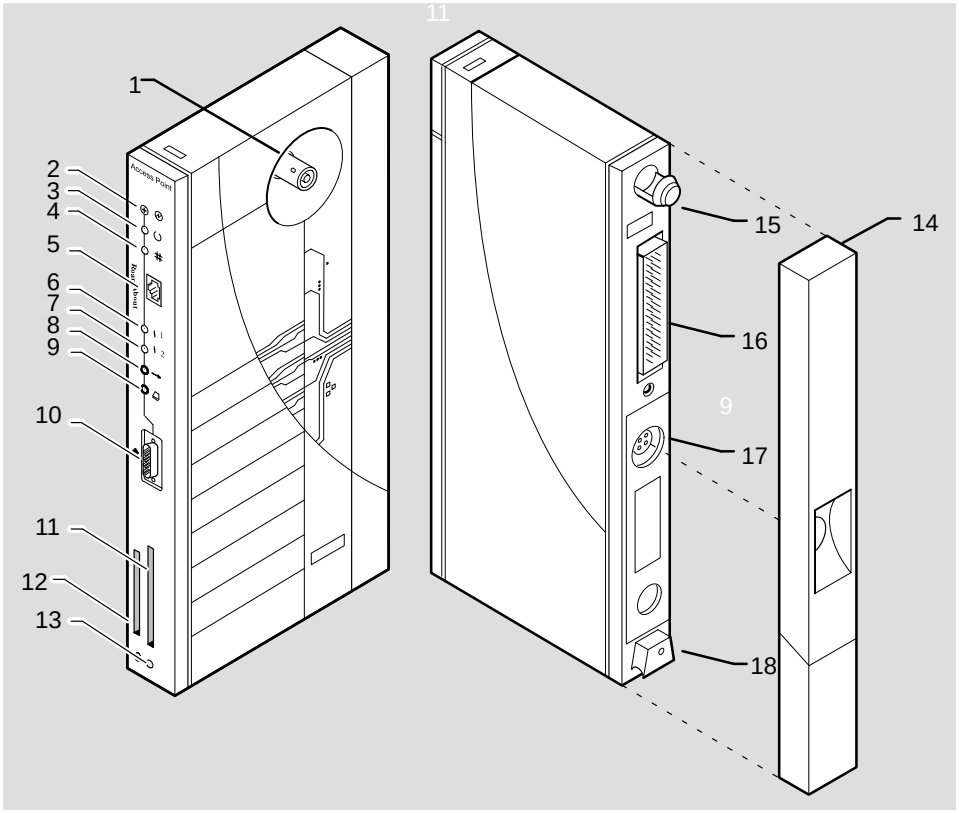
1.2 Summary of Access Point Features

The Access Point operates at the Data Link layer of the Open System Interconnection (OSI) model.

The Access Point has the following features:

- Wireless connectivity to your LAN using a Digital RoamAbout PC Card Network Adapter
- Inter-cell roaming (roaming between the coverage areas of two or more Access Points)
- Direct Sequence (DS) and Frequency Hopping (FH) technology support
- Allows mobile end stations to roam from one wireless LAN into another wireless LAN without losing connectivity
- 8000 node forwarding address database
- Inter-cell roaming
- ThinWire (10base2) and 10BaseT support
- SNMP manageability
- Local setup port manageability
- Software selectable full bridge, or workgroup bridge mode of operation
- Protocol independent bridging
- Source and destination address filtering
- Protocol filtering
- Redundancy through 802.1D Spanning Tree
- Configurable rate limiting for protocols and multicast addresses
- Default multicast rate limiting implemented from wire–to–wireless at 100 kbps for DS-type PC Cards.
- Default multicast rate limiting implemented from wire–to–wireless at 27 packets per second for FH-type PC Cards
- User-selectable enabling and disabling of default rate limiting
- Auto-configuration of channels within a domain (FH-type PC Card)
- Auto-configuration of network ID (DS-type PC Card)
- Downline-load capability (for software upgrades and assigning IP addresses) using BOOTP and TFTP
- Standalone or mountable in a DEChub 900 or DEChub 90
- Power-up diagnostics

Figure 1–1 Front, Side, and Rear View of the Access Point



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The module contains the following external parts, LEDs, connectors, ports, and controls:

1. **Network Connector (BNC)**. Connects the module to a ThinWire network. This connector is not used if the AP is connected to a 10BaseT network, or if the module is installed in a DEChub 900 or DEChub 90.
2. **Power OK LED** ⏻. Lights (green) when the module has power.
3. **Module OK LED** ↻. Lights (green) when the module passes its power-up self-test. If the module fails the power-up self-test, the Module OK LED is off. If this LED is flashing, the Ethernet or wireless port (or both) has a fault, preventing connection to the network.

4. **Wired LAN Activity LED** #. Indicates the status of the wired Ethernet segment. The LED lights (green) when packets are received on the Ethernet port and then forwarded to the wireless port or the AP's management software. Packets received and filtered are not shown.

   The LED also lights when the AP's management software transmits packets on the Ethernet port. The data traffic forwarded to the Ethernet port is not shown. The average brightness of the LED indicates the level of activity on the Ethernet port. If the LED is flashing together with the Bridge State LED (6), the Ethernet port has a fault that prevents the AP from establishing a connection to the network.

5. **10BaseT Ethernet Connector**. Connects the module to a 10BaseT network. This connector is not used if the AP is connected to a ThinWire network, or if the module is installed in a DEChub 900 or DEChub 90.

6. **Bridge State LED**. Lights (green) when the AP is forwarding packets.

7. **Access Point Saturated LED**. Lights (yellow) when the AP is saturated. Saturation occurs when the AP cannot forward packets from the Ethernet to the wireless side due to the lower throughput of the wireless network.

   The degree of brightness (of the LED) indicates the level of saturation. The LED dims (and eventually extinguishes) as the network congestion is processed.

8. **Wireless LAN Activity LED**. Lights (green) when a PCMCIA network adapter is transmitting or receiving. Packets received and filtered are not shown. The average brightness of the LED indicates the level of activity on the wireless port.

   If the LED is flashing together with the Bridge State LED (6), the wireless port has a fault that prevents the AP from establishing a connection to the network.

9. **PC Card Present LED**. Lights (green) when a Digital RoamAbout PC Card network adapter is correctly installed at power-up.

10. **Local Setup Port**. Used to access the AP's local setup utility. Also referred to as a console port.

11. **PC Card Slot**. Used for Digital RoamAbout PC Card network adapters.

12. **Ethernet Hardware Address**. Unique physical address of the AP.

13. **Reset Button**  . Forces a downline load of the AP's software from a load host and resets the AP to its factory default settings.
14. **Back Cover**. Present on standalone units only. Covers the backplane connector and mounting assembly.
15. **Locking Tab**. Locks the module into a DEChub 900 or DEChub 90.
16. **48-Pin Backplane Connector**. Provides network and power connections to the AP when it is installed in the DEChub 900 or DEChub 90.
17. **Power Supply Connector**. Receives +5 volts of dc power from the AP's standalone power supply. Not used when the unit is installed in a DEChub 900 or DEChub 90.
18. **Mounting Tab**. Secures the module to the backplane when the module is installed in a DEChub 900 or DEChub 90.

1.3 Product Specifications

This section describes the physical, electrical, and environmental specifications of the Access Point.

1.3.1 Physical Specifications

Table 1–1 lists the physical specifications of the Access Point.

Table 1–1 Physical Specifications

Parameter	Value
Height	3.18 cm (1.25 in)
Width	27.31 cm (10.75 in)
Depth	12.70 cm (5.0 in)
Weight	.68 kg (1.5 lb)

1.3.2 Electrical Specifications

Table 1–2 lists the electrical characteristics for the Access Point.

Table 1–2 Electrical Specifications

Voltage	Current (Amperes)	Power (Watts)
+5.0 V	1.2 A	6.0 W

1.3.3 Environmental Specifications

Table 1–3 lists the environmental specifications of the Access Point.

Table 1–3 Environmental Specifications

Parameter	Value
Operating Environment:	
Temperature[1]	5°C to 50°C (41°F to 122°F)
Maximum rate of change	20°C/h (36°F/h)
Relative humidity	10% to 95% (noncondensing)
Wet-bulb temperature	32°C (90°F)
Altitude	Sea level to 2.4 km (8000 ft)
Air flow	Convectively cooled.
Nonoperating environment:	
Temperature	–40°C to 66°C (–40°F to 151°F)
Relative humidity	Up to 95% (noncondensing)
Altitude	Up to 4.9 km (16,000 ft)
Certifications	
CE, CSA, FCC,TÜV, UL, VCCI	

[1] For sites above 4900 m (16,000 ft), decrease the operating temperature specification by 1.8° C for each 1000 m or 3.2°F for each 3200 ft.

1.3.4 Power Supply Specifications

Table 1–4 lists the electrical specifications of the AP's power supply.

Table 1–4 Power Supply Specifications

Parameter	Value
Input voltage	100 Vac to 240 Vac
Current at 120 V	0.25 A
Frequency	50 Hz to 60 Hz
Power consumption	16 W
Output voltage	5.1 Vdc
Output current (maximum)	1.8 A

1.3.5 Acoustical Specifications

Table 1–5 lists the acoustical specifications of the AP.

Table 1–5 Acoustical Specifications

Acoustics — Declared values per ISO 9296 and ISO 7779[1]

Product	Sound Power Level L_{WAd}, B	Sound Pressure Level L_{pAm}, dBA (bystander positions)
	Idle/Operate	***Idle/Operate***
DEIAP	No acoustic noise	No acoustic noise
DEIAP + H7082–AB	No acoustic noise	No acoustic noise

Schallemissionswerte — Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779[2]

Produkt	Schalleistungspegel L_{WAd}, B	Schalldruckpegel L_{pAm}, dBA (Zuschauerpositionen)
	Leerlauf/Betrieb	***Leerlauf/Betrieb***
DEIAP	keine meßbaren Schallemissionen	keine meßbaren Schallemissionen
DEIAP + H7082–AB	keine meßbaren Schallemissionen	keine meßbaren Schallemissionen

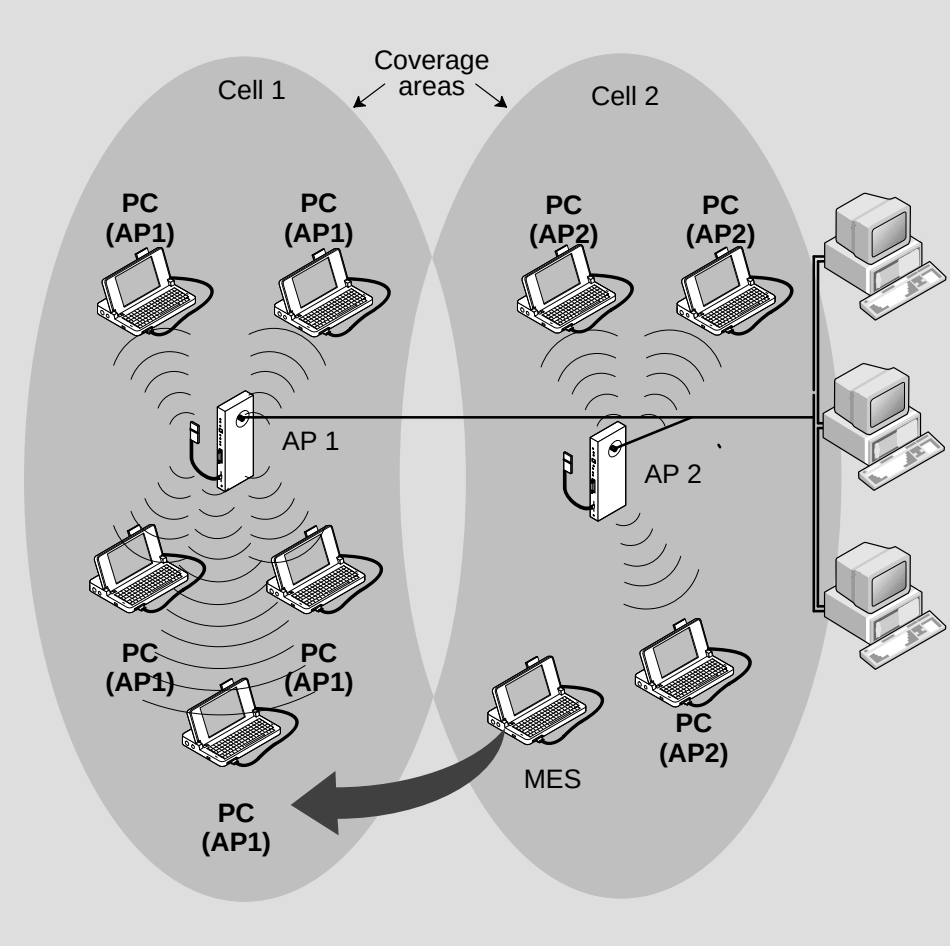
[1] Current values for specific configurations are available from Digital Equipment Corporation representatives. 1 B = 10 dBA.

[2] Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1 B = 10 dBA.

1.4 Roaming

The Access Point enables mobile end stations to move from the coverage area of one AP into the coverage area of another AP while maintaining LAN connectivity. This capability is called *roaming*. Figure 1–2 illustrates an MES roaming from one AP coverage area to another.

Figure 1–2 Roaming



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In Figure 1–2, Cell 1 and Cell 2 share overlapping areas of coverage. As an MES moves from Cell 2 to Cell 1, the necessary infrastructure network information is passed from Access Point 2 (AP2) to AP1.

When a mobile end station (such as the laptop computer in Figure 1–2) approaches the boundary of a coverage area, it enters a promiscuous mode. In this mode, the MES searches for a new AP that provides a better quality signal, resulting in more reliable data throughput.

Refer to Chapter 4 for information about setting roaming parameters.

1.5 Access Point Bridging Services

The Access Point provides the following bridging services:

- **Store-and-forward capability** — The AP receives, checks, and transmits frames to other LANs, enabling the configuration of extended LANs.
- **Frame filtering based on address** — Using the address database and the source and destination addresses from incoming frames, the AP's forwarding and translating process module isolates the traffic that *should not be allowed* on other LANs. This action reduces the total data traffic on an extended LAN by not forwarding the packets that have local destination addresses or packets that are not allowed to be forwarded. This increases bandwidth efficiency.
- **Data Link layer relay** — Operation at this layer makes the AP transparent to the protocols that use the LAN connectivity service. This protocol transparency is a key factor in the extended LAN service.
- **Dynamic address learning** — The forwarding and translating process module automatically adds new source addresses to the address database while the AP is operating. This *reverse learning* of the address and port association allows automatic configuration of the network without prior downline loading of configuration data to the AP. Note that the address learning is protocol and management entity independent.

  How long an address remains in the database is determined by an "Aging Timer" that measures how much time has elapsed since data was last addressed to or from a particular node. The timer is set to either 2 minutes or 32 minutes, depending on whether the AP is operating in Full Bridge or Workgroup Bridge mode. If the timer lapses without any traffic, the node's address is removed from the database.

- **Full Bridge mode** — When configured for Full Bridge mode, the AP learns addresses from both the wireless network and the wired Ethernet LAN. The AP filters packets based on their destination address and forwards all packets with unknown addresses. The default Aging Timer interval in Full Bridge mode is 2 minutes.
- **Workgroup Bridge mode** — When configured for Workgroup Bridge mode (the default operating mode), the AP learns addresses only from the wireless side of the network. In this mode, the AP only forwards packets to multicast addresses, broadcast addresses, and known addresses on the wireless LAN. (Note that this mode helps reduce the amount of traffic to your wireless LAN.) The default Aging Timer interval in Workgroup Bridge mode is 32 minutes.

1.6 Configuring Your Access Point

The Access Point has a local setup utility that enables you to configure and manage the AP. The AP also supports simple network management protocol (SNMP) through any standard Network Management Station (NMS) that supports SNMP, such as the Digital POLYCENTER Manager on NetView.

The local setup port interface allows you to change wireless parameters (to suit your specific requirements) and set up the AP for roaming and SNMP management.

The SNMP management capability enables you to manage standard SNMP MIB characteristics, such as protocol filtering and address filtering. To use SNMP management with the Access Point, you must obtain a valid IP address and configure the AP using either the local setup port interface, or by downloading an IP address using BOOTP. Refer to Chapter 4 for details about the SNMP management interface.

1.7 Managing Your Access Point with SNMP

You can manage your Access Point using any SNMP-compliant Network Management Station (NMS). These NMS systems use the MIB objects to manage the system. The Access Point supports the following MIB objects:

- MIB II (RFC–1213)
- IETF Bridge MIB (RFC–1493)
- Ethernet MIB (RFC–1398)
- DEC ELAN Vendor MIB
- HUB PCOM MIB
- AT&T WaveLAN MIB
- Proxim RangeLAN MIB

For details on the management features of each MIB, consult your NMS documentation.

To enable SNMP management for the AP, use the setup port utility and perform the following tasks (described in Section 4.3.1):

1. Set the in-band interface IP address of the AP.
2. Set the in-band interface default gateway address.
3. Optionally set the SNMP read/write community name (default is “public”).
4. Optionally add SNMP trap addresses.

The remaining chapters in this guide explain how to install, configure, and problem solve the Access Point.

2

Preparing for the Installation

This chapter describes the contents of the shipment, discusses site verification information, and provides instructions for connecting a Digital RoamAbout PC Card Network Adapter to the Access Point (AP).

Note

A Digital RoamAbout DS-type PC Card Network Adapter (also referred to as a network adapter) is used in the examples in this chapter. Refer to your network adapter documentation for specific instructions on installing and configuring the network adapter.

2.1 Overview

Before installing the AP, you must complete the following tasks:

- Review the site preparation checklist (Section 2.2).
- Unpack the unit and check the contents of the shipment (Section 2.3).
- Select the location to install the AP (Section 2.4).

2.2 Reviewing the Site Preparation Checklist

Before you unpack and install the AP, review the following checklist to ensure that all site preparation tasks were completed.

General

√ Determine where you will install the AP. Ideally, the AP should be located as high as possible. For more information, refer to Section 2.4.

Hardware

√ Ensure that the Ethernet LAN is in place and operable.

√ If you are installing the AP in a standalone configuration, locate the Ethernet interface device (for example, a ThinWire segment, DECconnect faceplate, or other appropriate network device) to which to connect the AP. Otherwise, if you are installing the AP in a DEChub 900 or DEChub 90, ensure that the device is installed and operable.

√ If you are installing the AP in a standalone configuration, ensure that an appropriate ac power source is within 1.6 m (5.5 ft) of the AP.

√ Ensure that a setup port device (a terminal or PC with terminal emulation software) is available at the site for connection to the AP. The setup port device can be used to set the wireless parameters (and optional SNMP parameters) on the AP.

√ Ensure that network adapters are obtained for each mobile end station (MES) and the AP. All the network adapters must be of the same type. For example, if you are using a DS-type Digital RoamAbout PC Card Network Adapter with the AP, each MES must also be equipped with a DS-type Digital RoamAbout PC Card Network Adapter.

Note

Computers equipped with Digital RoamAbout DS/ISA or FH/ISA network interface cards can also be used in your wireless LAN (either along with, or in place of, the mobile end stations).

Electrical and Environmental Requirements

√ Ensure that the electrical and environmental requirements are within the ranges described in the Product Specifications section in Chapter 1.

Cabling Requirements

√ **For standalone and DEChub 90 AP configurations**: Ensure that you have two 9-pin DECconnect adapters (H8571–J) and an MMJ DECconnect BC16E cable for connecting the setup port device to the AP.
For DEChub 900 configurations: Ensure that you have a 9-pin DECconnect adapter (H8571–J) and an MMJ DECconnect BN24H cable for connecting the setup port device to the DEChub 900.If your local setup port device is a PC running terminal emulation software, you can use a 9-pin, D-Sub (PC-compatible) serial (null modem) cable.

√ For a standalone configuration, ensure that you have the appropriate types and lengths of cable for connecting the AP to the wired Ethernet. For a 10BaseT connection, use a BN26K cable. For a ThinWire connection, you also need a BC16M cable, T-connector (H8223-00), and 50-ohm terminator (H8225-00).

Note

Refer to Appendix A for connector, cable and adapter pinout information.

For information on cabling and configuring Ethernet LANs and using DECconnect system products, refer to the *DECconnect System Planning and Configuration Guide*. This guide also provides ordering information.

2.3 Unpacking and Checking the Contents of the Shipment

Unpack the unit and check the shipment for damage or missing parts. The shipment includes the following:

- Digital RoamAbout Access Point
- Power supply (included only with the standalone version of the AP)
- Digital RoamAbout Access Point Owner's manual

If the AP module is damaged, immediately notify the delivery agent and your Digital sales representative.

2.4 Selecting the Location for the Access Point

Before you install your Access Point, select the most appropriate location for the AP in your environment.

You can install the AP in a DEChub 900 or DEChub 90, or mount the AP on a wall, ceiling, or cubicle partition. Ideally, the AP should be located so that a clear line of sight exists between the radio module component of the AP's network adapter and the radio modules on the mobile end stations.

Note

Minimize the number of obstructions between the AP and the mobile end stations it is communicating with. Obstructions, such as walls (especially those made of steel reinforced concrete or masonry), reduce the effective range of the radio transmissions from the network adapters.

To most effectively connect a wireless LAN, locate the AP so that it is centrally located within the group of mobile end stations. This enables all of the wireless mobile end stations to be within the AP's coverage area.

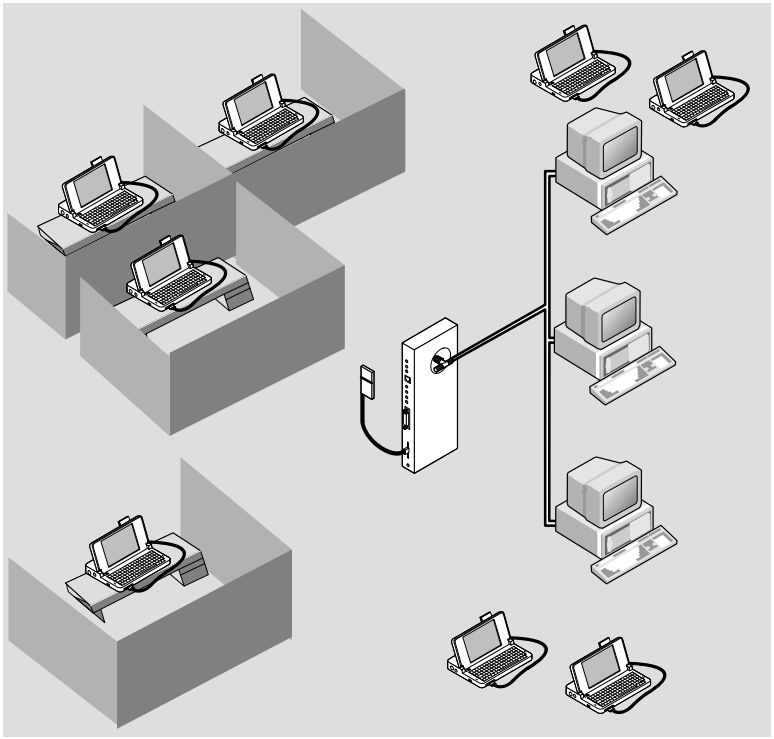
The size of the coverage area (in open air) is determined by the type of network adapter that you use with the AP and mobile end station(s). For instance, the DS-type Digital RoamAbout PC Card Network Adapter has an effective range of up to an 800-ft diameter area in open air. All wireless users must be within this coverage area to ensure that they can communicate with the AP. Walls, floors, office partitions, and other obstructions reduce the effective range of the wireless network adapters.

Note

Refer to the network adapter documentation for specific information about allowable distances.

Figure 2–1 shows a typical configuration using a centrally located, standalone Access Point.

Figure 2–1 Mounting the Access Point in a Central Location



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For some building designs, centralized mounting may not be practical. If permanent obstructions prevent you from centrally mounting the Access Point, mount it as high as possible.

3

Installing Your Access Point

This chapter provides the step-by-step procedure to install the Digital RoamAbout PC Card Network Adapter (also referred to as a network adapter) and the Access Point.

Note

Before installing the AP, ensure that all the procedures in Chapter 2 are completed.

3.1 Installation Overview

Installing the AP involves the following tasks:

- Installing the network adapter into the AP
- Connecting the AP to the wired Ethernet, or inserting the module in a DEChub 900 or DEChub 90
- Verifying the operation of the AP
- Setting the wireless parameters for the AP
- Verifying the communication link between the network adapters

3.2 Installing the Network Adapter

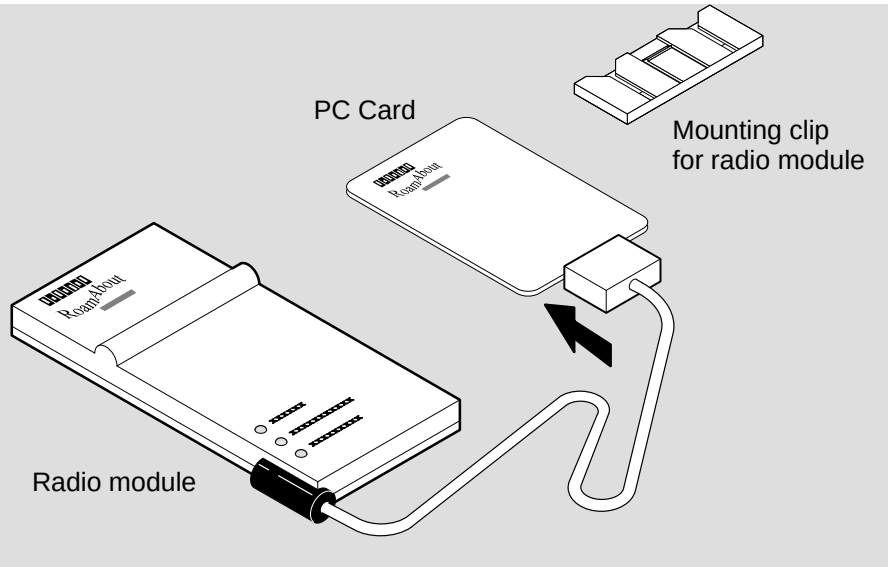
To install the network adapter, do the following:

Note

Do not try to insert or swap a PC Card in the AP if the AP power is on or the unit is installed into a DEChub 900 or DEChub 90. Always unplug the AP from the power supply (or remove the AP from the DEChub) before inserting a PC Card.

1. Assemble the network adapter by connecting the radio module to the PC Card, using the cable supplied with the device. See Figure 3–1.

Figure 3–1 Assembling the Digital RoamAbout PC Card Network Adapter



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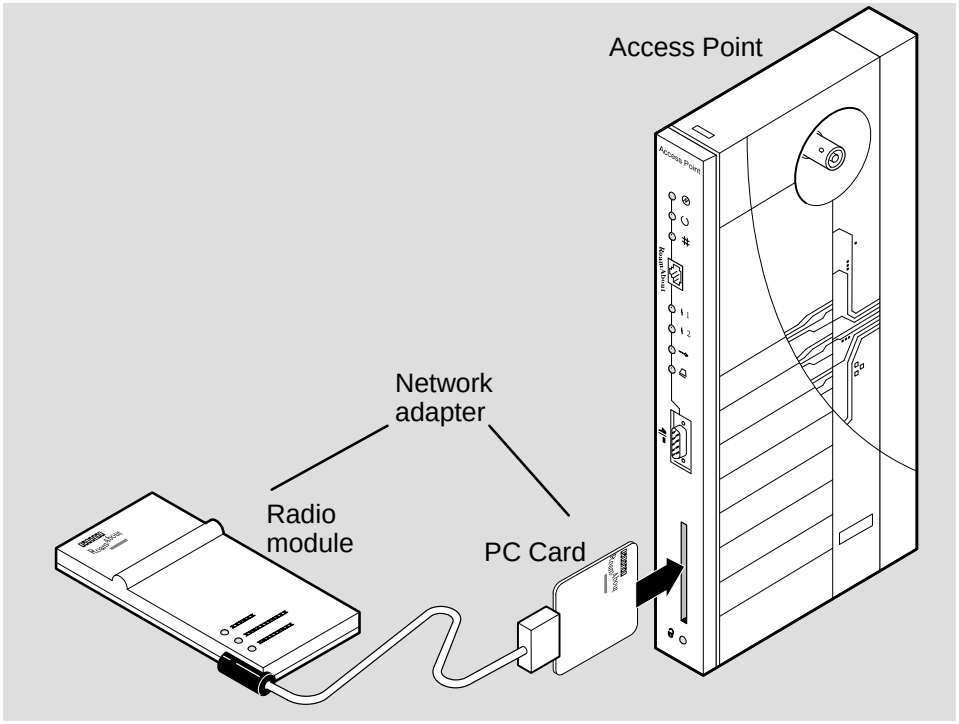
2. With the logo on the PC Card facing the same direction as the AP's BNC connector, insert the PC Card into the AP's PC Card slot (see Figure 3–2).

Figure 3–2 Installing the Network Adapter in the AP



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When properly inserted, the PC Card protrudes approximately 1/4 inch from the Access Point. You will sense a slight resistance as you insert the PC Card into the slot. Gently, but firmly, push the PC Card into the slot until it is fully seated.

Note

For additional information about your network adapter, refer to the documentation associated with the network adapter.

3.3 Installing the AP into a Standalone Configuration

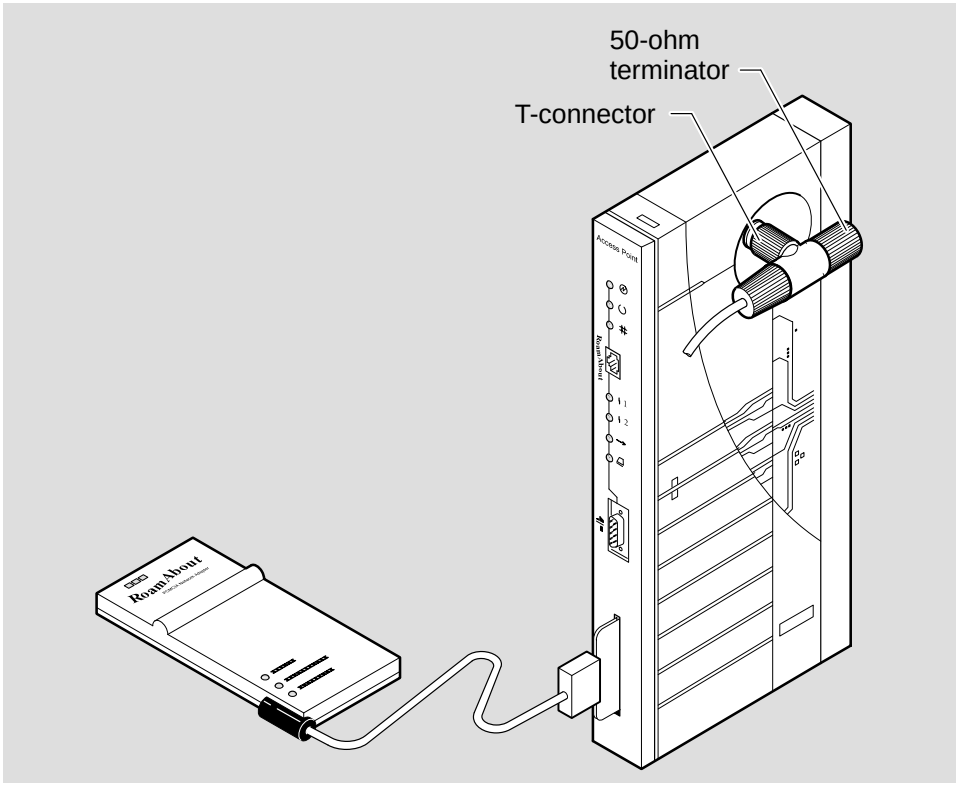
This section describes how to install the AP as a standalone module. To install the unit in a DEChub 900 or DEChub 90, refer to Section 3.4.

Perform the following procedure to install the AP as a standalone module:

1. Select the appropriate location for the installation of your AP.
2. Connect the AP to the wired network using either the 10BaseT or ThinWire connectors, as follows:

   To Connect to ThinWire Network — Connect a ThinWire cable, T-connector, and terminator to the BNC connector on the AP, as shown in Figure 3–3.

Figure 3–3 Connecting to a ThinWire Network



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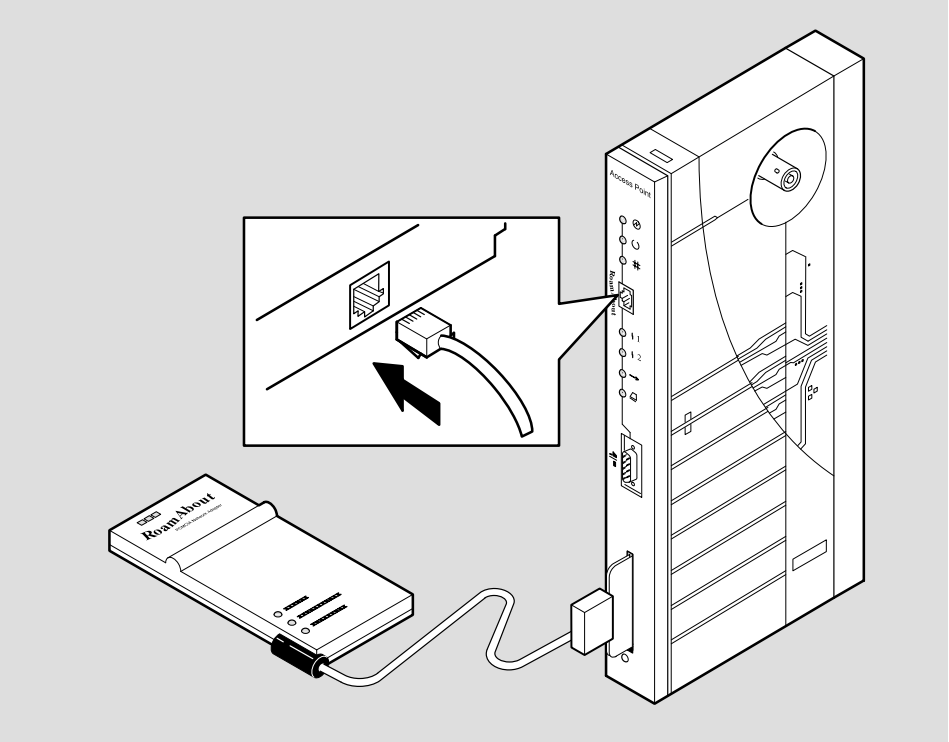
To connect to a 10BaseT Network — Connect the 10BaseT cable to the 10BaseT Ethernet connector, as shown in Figure 3–4.

Figure 3–4 Connecting to a 10BaseT Network



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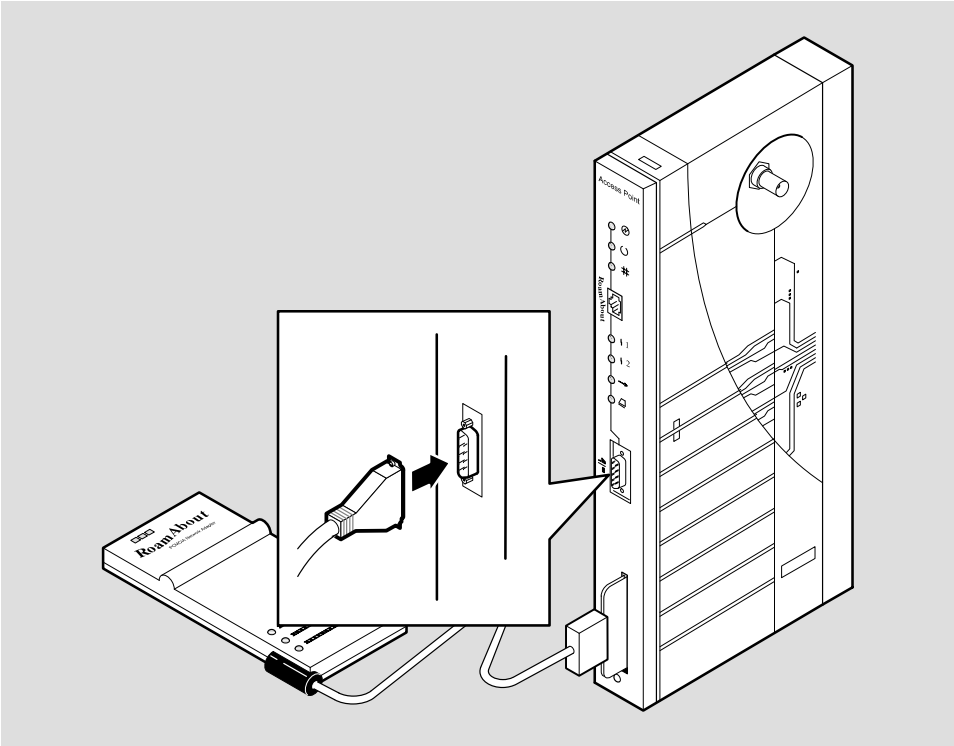
3. Connect the other end of the ThinWire cable or 10BaseT cable to an active Ethernet outlet, such as a DECconnect faceplate or other appropriate network device.

4. Connect a 9-pin serial cable to the AP's 9-pin, D-Sub, PC-compatible serial port, as shown in Figure 3–5.

Note

The pinouts for the AP's local setup connector are listed in Appendix A.

Figure 3–5 Connecting to the Setup Port



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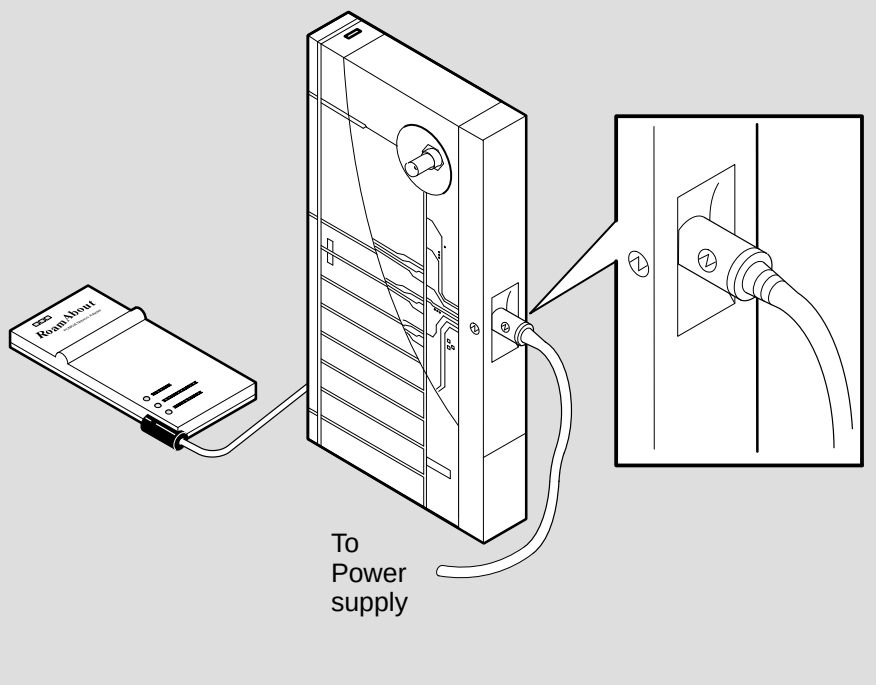
5. Connect the AP's power supply cable to the power connector on the back panel of the module, as shown in Figure 3–6.

Note

The PC Card be inserted before applying power to the AP, as described in Chapter 2. Do not try to insert or swap a PC Card in the AP after connecting the AP's power supply to an AC outlet.

6. Connect the power supply to an AC outlet to turn on the AP.

Figure 3–6 Connecting the Power Supply Cable



LKG–8185-93I

3.4 Installing the AP into a DEChub 900 or DEChub 90

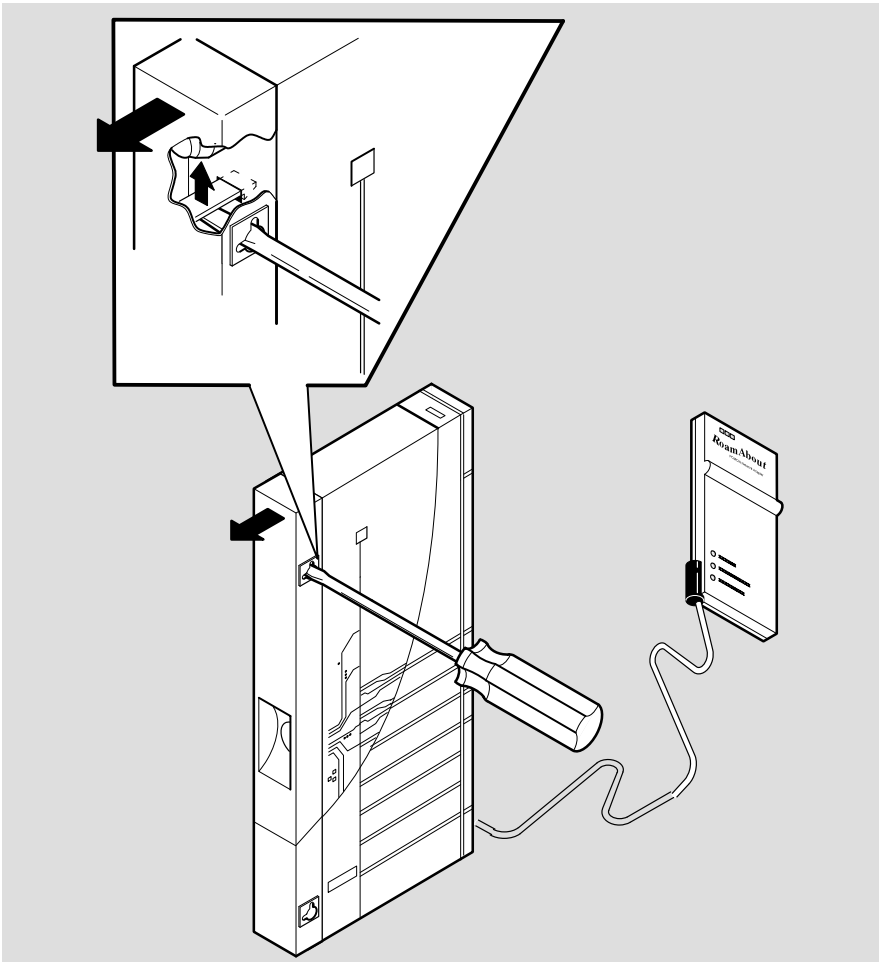
This section describes how to install the unit in a DEChub 900 or DEChub 90. To install the AP in a standalone configuration, refer to Section 3.3.

3.4.1 Removing the Back Cover

If there is a cover on the back of the AP, you must remove it before inserting the AP into the backplane. Perform the following steps to remove the back cover:

1. Lift up the latch on the back cover by inserting a flat-blade screwdriver into the top mounting hole, as shown in Figure 3–7.
2. With the latch up, pull the top of the back cover away, pivoting at the bottom of the module.

Figure 3–7 Removing the Back Cover



LKG–6722–92I

3.4.2 Seating the Module in the DEChub 900 or DEChub 90

The DEChub hot-swap feature allows you to install the module in the DEChub 900 or DEChub 90 without turning off power. Seating the module initiates the power-up sequence.

Note

Do not try to insert a PC Card into the AP while the AP is powered on. Refer to Chapter 2 for instructions on how to insert the PC Card.

Always remove the AP from the DEChub 900 or DEChub 90 before swapping a PC Card. Refer to Section 3.4.3 for instructions on how to remove the AP from a DEChub 900 or DEChub 90.

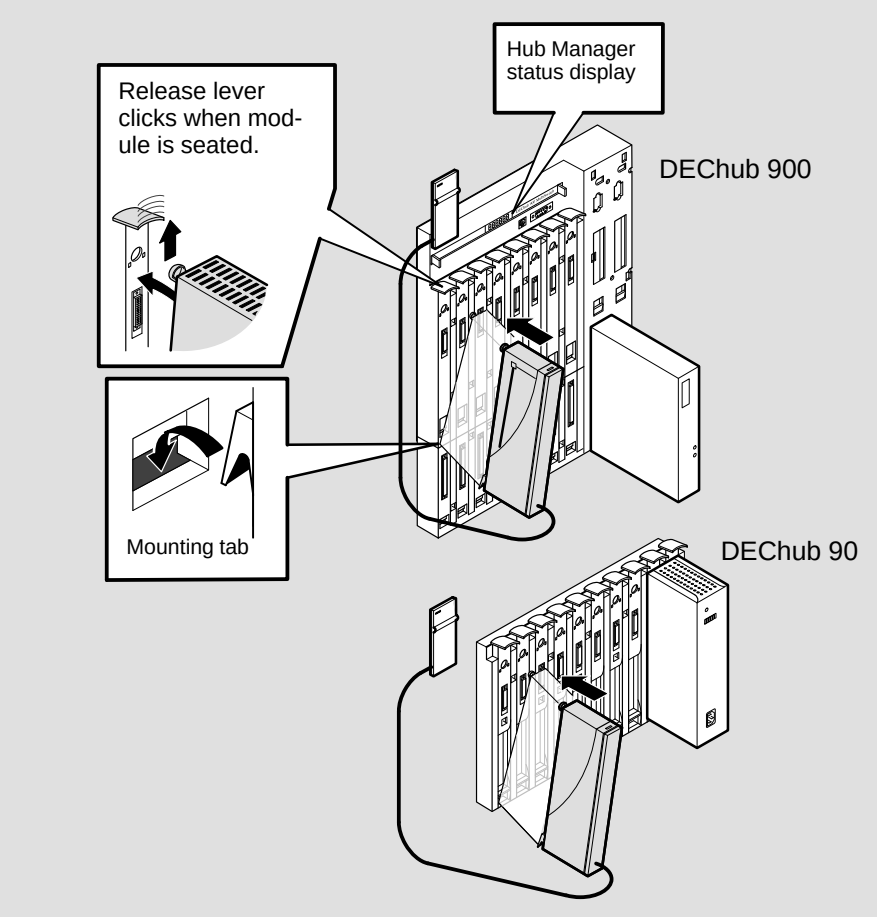
Perform the following steps to install the AP in the DEChub 900 or DEChub 90:

Note

When installing the AP into a DEChub 90, you must connect the setup port device to the setup port before applying power to the AP.

1. Place the module's mounting tab into the first mounting slot on the DEChub 900 or DEChub 90, as shown in Figure 3–8.
2. Pivot the module on the mounting tab and align the connectors.
3. Firmly push the module onto the backplane connectors until the release lever clicks.
4. Press down on the release lever to ensure that it is locked.
5. Secure the radio module to its mounting point, using the mounting material enclosed in the wireless network adapter kit. For information on how to secure and mount the Digital RoamAbout PC Card Network Adapter, refer to the *Digital RoamAbout PC Card Network Adapter Owner's Manual*.

Figure 3–8 Installing into a DEChub 900 or DEChub 90



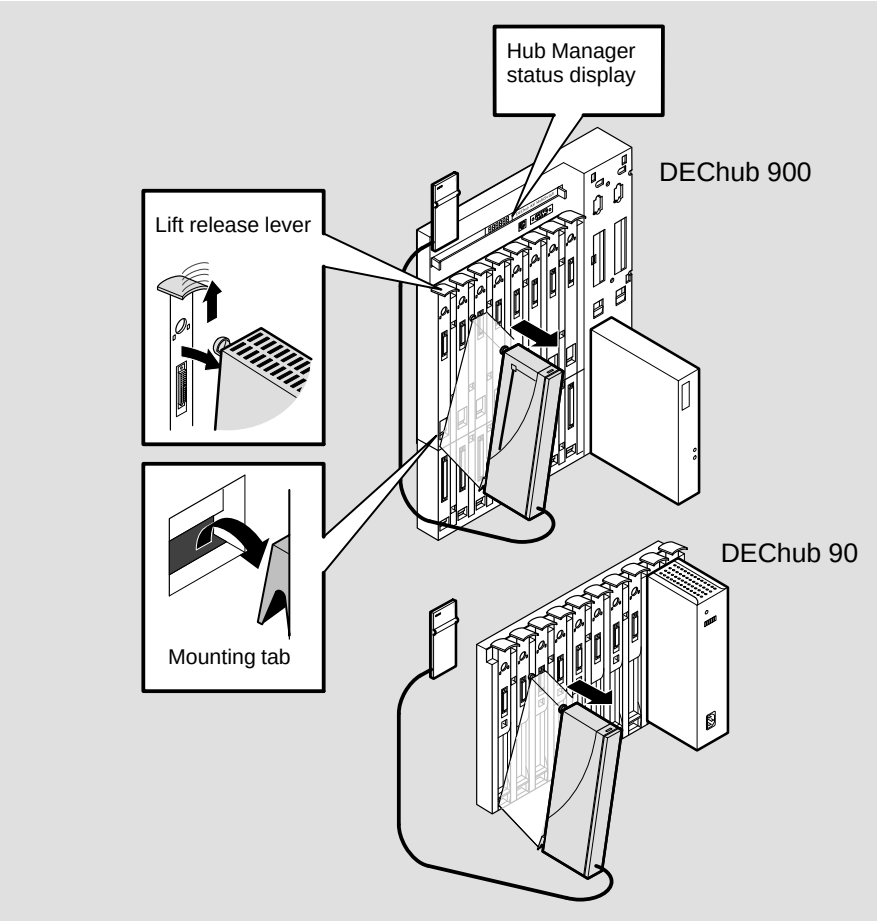
LKG–9453-94I

3.4.3 Removing the Module from the DEChub 900 or DEChub 90

If you need to remove the unit from a DEChub, perform the following procedure:

1. Lift the release lever located on the top of the DEChub 900 slot or the DEChub 90 slot, as illustrated in Figure 3–9.
2. Pivot the module back on its bottom mounting tab, and disengage the module from the backplane.

Figure 3–9 Removing from a DEChub 900 or DEChub 90



LKG–9454-94I

3.5 Verifying the Operation of Your Access Point

The Access Point runs a series of self-tests on power-up and reports status using its LEDs.

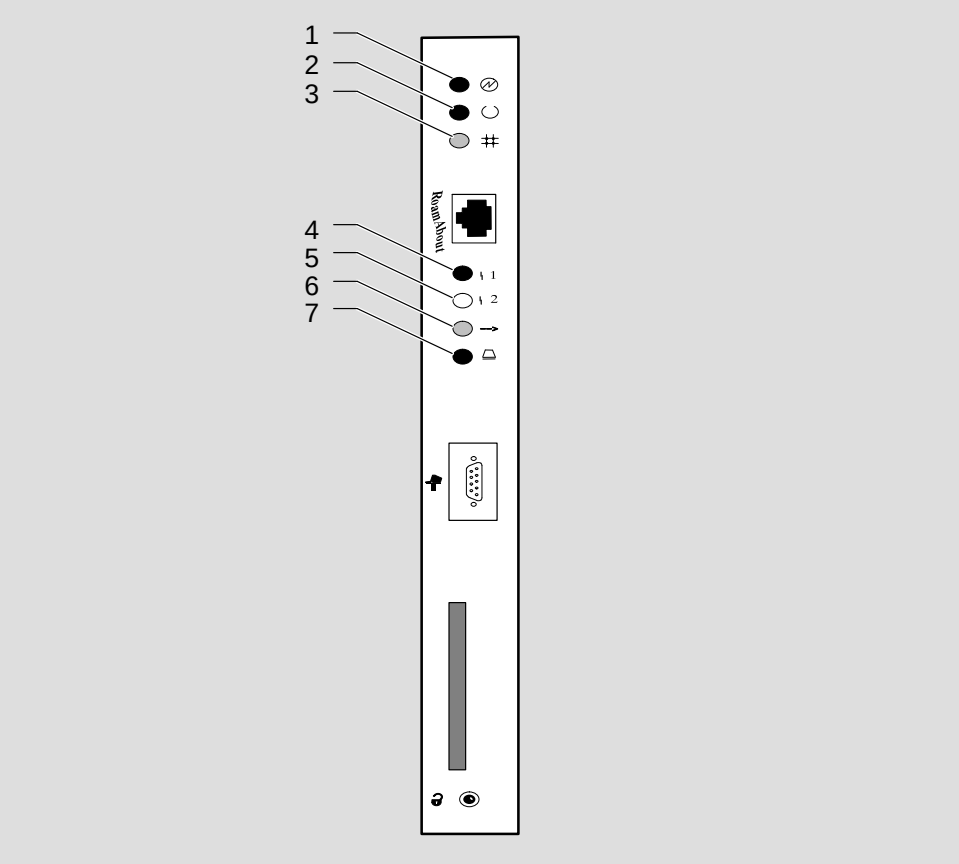
When power-up begins, the following occurs:

1. The firmware begins running diagnostics, initializes minimal hardware, then sequentially turns LEDs 2 through 6 on and off.
2. After LED 6 turns on and then turns off, the firmware completes its diagnostics and hardware initialization. During this portion of the diagnostics and hardware initialization, LEDs 2 through 7 flash on and then off.
3. The diagnostics then checks to see if a PC Card is properly inserted in the AP. If a card is present, LED 7 lights.

The diagnostics take approximately 10 seconds to complete after power-up. Upon successful completion of the diagnostics, the LED pattern shown in Figure 3–10 is displayed.

If the unit fails to display the proper LED pattern, verify that you have correctly installed the module according to the instructions in this chapter. If the unit still fails to display the LED pattern shown in Figure 3–10, refer to Chapter 5.

Figure 3–10 Normal LED Pattern



LKG-10067-93I

Item	LED Name	Operational State
1	Power OK	On = power is okay
2	Module OK	On = self-test passed
3	Wired LAN OK	Blinking = network connection
4	Bridge State	On = lights after 30 seconds indicating that the AP is forwarding packets
5	AP Saturated	Off
6	Wireless LAN Activity	Blinking
7	PC Card Present	On = PC Card is installed

3.6 Setting the PC Card Parameters

The PC Card parameters for the DS–type and FH–type Digital RoamAbout PC Card Network Adapters are different. The following sections describe default parameter settings.

3.6.1 DS-type PC Card Parameters

The DS-type PC Card is shipped with a default Network ID based on the hardware MAC address, and Domain ID and Beacon Key values of 1.

Note

In a nonroaming configuration, ensure that all the mobile end stations that communicate through the AP use the same Network ID. Refer to the documentation for your network adapter for information about the Network ID format and parameters.

To change the Network ID and roaming parameters, use the local setup port utility described in Chapter 4. Chapter 4 also provides instructions for specifying the AP's SNMP management parameters. If you intend to use SNMP management, you can set these parameters at the same time you change the wireless Network ID, Domain ID, and Beacon keys.

3.6.2 FH-type PC Card Parameters

The FH-type PC Card is shipped with an Autochannel based on the last digit of the MAC address, a Subchannel default of 1, and a Domain default of 0.

To change the Channel, the Subchannel and the Domain parameters, use the local setup port utility described in Chapter 4. Chapter 4 also provides instructions for specifying the AP's SNMP management parameters. If you intend to use SNMP management, you can set these parameters at the same time you change the wireless Channel, the Subchannel, and the Domain parameters.

3.7 Verifying the Communication Link Between the Network Adapters

The Digital RoamAbout PC Card Network Adapter diskette includes diagnostic utilities that allow you to verify the communications path between network adapters in the wireless LAN. You can run the diagnostic utilities on any mobile end station that is within range of the AP.

Refer to the owner's manual for your RoamAbout Network Adapter for details about the available diagnostic utilities.

4

Configuring Your Access Point

This chapter describes how to configure your Access Point locally from a setup port or remotely from a Network Management Station (NMS).

You can configure the Access Point (AP) in two ways:

- The Access Point setup port utility

  Local setup port commands allow you to configure the AP using a setup port device (a terminal or personal computer running terminal emulation software).
- SNMP management from a Network Management Station (NMS)

  You can use any SNMP-compliant NMS to perform in-band management of the AP. For information about how your NMS performs these functions, refer to the documentation for your specific management station.

4.1 Configuring the Access Point Using the Setup Port

The setup port (on the DEChub 900, or as a standalone) allows you to access and set Access Point parameters. This section describes how to access the module from either port and how to set those parameters.

Examples of the actual setup screen displays are provided in this section to aid in the description of the setup port and to display the options that are available. Because they are examples only, the displays can vary slightly from the actual screen displays on your setup port device. **Boldface type** in the screen display examples indicate user input.

The format of an IP address is the standard 4-octet dotted decimal notation, where each octet of the address is represented as a decimal value, separated by a decimal point (.). The following is an example of an IP address:
`16.20.54.156`

4.1.1 Setup Port Signaling Standards

Signals from the DEChub 900 setup port and from the standalone setup port conform to the EIA-232D signaling standard at **9600 baud** only. To the user, the port appears as a data terminal equipment (DTE) device.

4.1.2 Connecting to the Setup Port

The setup port on the AP standalone unit or the DEChub 900 MultiSwitch can be connected to a setup port device (a terminal or personal computer) by using the cables and adapters listed in Table 4–1 and shown in Figure 4–1. Refer to Appendix A for the setup port connector, cable and adapter pinouts.

To connect to the Access Point setup port, do the following:

1. Ensure that the transmit and receive baud rates on the setup port device are set to **9600 baud** only.
2. Connect the setup port device to the setup port connector on either the Access Point front-panel serial port or the DEChub 900 setup port.

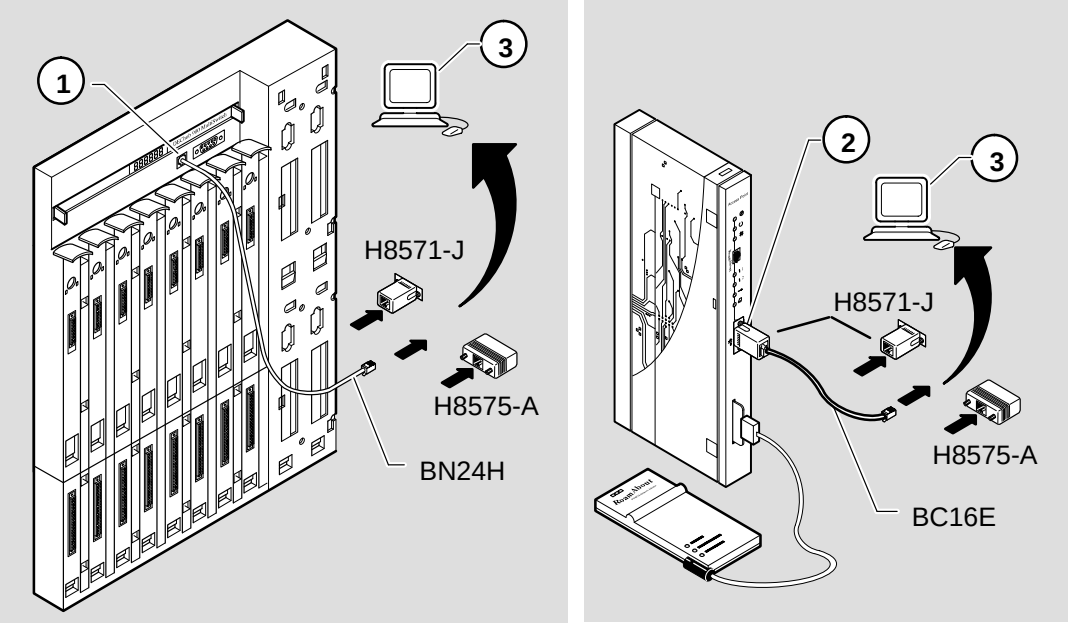
Table 4–1 Setup Port Cabling

Connecting to a...	If the setup port device is a...	Then use this cable...	With these adapters...
Standalone AP or DEChub 90	PC with a 9-pin D-Sub communications port and terminal emulation	BC16E-xx[1] or any std. PC compatible 9-pin serial cable.	H8571–J (qty = 2)[2]
	Terminal with a 25-pin D-Sub connector	BC16E-xx[1]	H8575–A, H8571–J[2]
	Terminal with a 6-pin MMJ connector	BC16E-xx[1]	H8571–J[2]
DEChub 900	PC with a 9-pin D-Sub communications port and terminal emulation	BN24H-xx[1]	H8571–J
	Terminal with a 25-pin D-Sub connector	BN24H-xx[1]	H8575–A
	Terminal with a 6-pin MMJ connector	BN24H-xx[1]	

[1] xx indicates cable length in meters.

[2] The AP requires an H8571–J also.

Figure 4–1 Setup Port Cabling



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Item	Description
1	DEChub 900 setup port
2	Access Point setup port
3	Setup port device

4.2 Using the Access Point Setup Port

After you have completed the setup port cabling, perform the following steps to access the AP installation menu.

1. Press Return on the setup port device a few times until a menu appears.
   a. If the AP is connected to a DEChub 90 or is a standalone unit, the Access Point Installation Menu appears. Go to Section 4.3.
   b. If the AP is connected to the DEChub 900 setup port, the Hub Manager Installation Menu appears (see the following example).
2. Choose option 9; then go to the section titled Start Redirect Mode, as shown in the following example.

```
    DEChub 900 MultiSwitch
═══════════════════════════════════════

    DEChub 900 MultiSwitch INSTALLATION MENU

    [1]  Reset with Factory Defaults
    [2]  Reset with Current Settings
    [3]  Show Current Settings
    [4]  Configure IP...
    [5]  Dump Error Log
    [6]  Downline Upgrade
    [7]  Configure Out-of-Band Port...
    [8]  Start Event Display Mode
    [9]  Start Redirect Mode...
═══════════════════════════════════════

         Enter selection number: 9 Return
```

3. After you choose the `Start Redirect Mode` option, enter the slot number as shown in the following example.

```
                      Enter selection: 9
═══════════════════════════════════════

    Enter the slot number for redirection (1–8):  [n] Return
    setup redirected to 3: RoamAbout Access Point
    Attempting connection [Ctrl/C to abort]...
```

4. Proceed to Section 4.3, Access Point Installation Menu.

4.3 Access Point Installation Menu

The Access Point Installation menu allows you to set parameters when the AP is initially installed.

Note

When installing the AP into a DEChub 90, you must connect the setup port device to the setup port before applying power to the AP.

The AP displays either of two Installation menus. When the AP is configured as a standalone or in a DEChub 90, the Installation Menu shown in Figure 4–2 is displayed. When the AP is configured in a DEChub 900, the Installation Menu shown in Figure 4–3 is displayed.

Note

The installation menu screen displays in this manual may vary slightly from the actual screen displays on your setup port device.

Figure 4–2 Access Point Installation Menu (Standalone and DEChub 90)

```
    RoamAbout Access Point
═══════════════════════════════════════════════

              RoamAbout Access Point INSTALLATION MENU

            [1]  Reset with Factory Defaults
            [2]  Reset with Current Settings
            [3]  Show Current Settings
            [4]  Set SNMP Read/Write Community
            [5]  Add SNMP Trap Addresses
            [6]  Delete SNMP Trap Addresses
            [7]  Dump Error Log
            [8]  Set In-Band Interface IP Address
            [9]  Set In-Band Interface Default Gateway Address
            [10] Downline Upgrade
            [11] Set Out-of-Band Interface IP Address
            [12] Set Out-of-Band Interface Port Speed
            [13] Module-Specific Options

                  Enter selection : n
═══════════════════════════════════════════════
```

Figure 4–3 Access Point Installation Menu (DEChub 900)

```
    RoamAbout Access Point
 ==========================================

              RoamAbout Access Point INSTALLATION MENU

            [1]  Reset with Factory Default
            [2]  Reset with Current Settings
            [3]  Show Current Settings
            [4]  Set SNMP Read/Write Community
            [5]  Add SNMP Trap Addresses
            [6]  Delete SNMP Trap Addresses
            [7]  Dump Error Log
            [8]  Set In-Band Interface IP Address
            [9]  Set In-Band Interface Default Gateway Address
            [10] Downline Upgrade
            [11] Module-Specific Options

            [Ctrl/C] Return to Hub Manager Menu

                  Enter selection : n
 ==========================================
```

4.3.1 Description of Access Point Installation Menu Options

This section describes the options that are available from the Access Point Installation Menu. Note that the Out-of-Band menu options apply to the module when it is in standalone mode only.

RoamAbout Access Point INSTALLATION MENU

[1] Reset with Factory Defaults

This option reboots the AP, causing the module's configured NVRAM parameters to be initialized to factory default values.

Note

This action deletes all configuration settings and replaces them with factory default values. All configuration settings will be lost.

Allow approximately 1 minute for the module to reset and complete its self-test.

The following example shows the dialog associated with this option.

```
   RoamAbout Access Point
==============================================

                        Enter selection : 1
==============================================

                     RESET WITH FACTORY DEFAULTS

     * * * * * * * * * * * * * * * * * * * * * * * * * * *
     *  IMPORTANT!         IMPORTANT!        IMPORTANT!      *
     * * * * * * * * * * * * * * * * * * * * * * * * * * *
     * This selection will delete the current configuration  *
     * settings and reset the system with the factory default*
     *   settings.  All configuration settings will be lost. *
     * * * * * * * * * * * * * * * * * * * * * * * * * * *

==============================================

                    Press Y to confirm [N] : Y
                    Press Return for Main Menu ...
```

RoamAbout Access Point INSTALLATION MENU

[2] Reset with Current Settings

This option reboots the AP but leaves the module's configured NVRAM parameters at their current settings.

Note

Allow approximately 1 minute for the module to reset and complete its self-test.

The following example shows the dialog associated with this option.

```
   RoamAbout Access Point
==========================================

                      Enter selection : 2
==========================================

                  RESET WITH CURRENT SETTINGS
         This selection will reset your system with the current
         configuration settings.
==========================================

                   Press Y to confirm [N] : Y
                   Press Return for Main Menu ...
```

Note

If you change any wireless configuration parameter (such as the Bridge mode, Network ID, Domain or the Domain ID), you must select this option to reset the AP.

RoamAbout Access Point INSTALLATION MENU

[3] Show Current Settings

This option shows the AP's current settings.

Note

If the module is being configured for the first time, some fields are blank.

The following example shows the dialog associated with this option.

```
    RoamAbout Access Point
 ==========================================

                        Enter selection : 2
 ==========================================

RoamAbout Access Point Wireless-to-Wired Bridge HW=Vn.n,RO=Vn.n, SW=Vn.n
SysUpTime                                : 00:13:30   31 resets
SNMP Read/Write Community                : public
SNMP Trap Addresses                      : Not Configured
Status of Last Downline Upgrade          : No Status
In-Band Interface Hardware Address       : 08-00-2B-A3-89-62
In-Band Interface IP Address             : 16.20.182.12
In-Band Interface Default Gateway Address : Not Configured
Out-of-Band (OBM) Interface IP Address   : Not Configured
Out-of-Band (OBM) Management Port Speed  : 0
Wired Ethernet MAC Address               : 08-00-2B-A3-89-62
Wireless Ethernet MAC Address            : 08-00-0E-20-83-31
Wireless Network Adapter                 : RoamAbout 915 DS/PC Card
Bridge Mode                              : Work Group
Upline Dump                              : DISABLED
Memory                                   : 1048576 bytes

 ==========================================

                    Press Return for Main Menu ...
```

RoamAbout Access Point INSTALLATION MENU

[4] Set SNMP Read/Write Community

If you want to perform SNMP management on the AP, you must assign it a community name. The format for a community name is a string consisting of 4 to 31 printable ASCII characters. This community name can be used by SNMP managers for read/write access control. The default community name is `public`.

In the following example, the string `Accounting` is entered as the AP's SNMP read/write community name.

The following example shows the dialog associated with this option.

```
    RoamAbout Access Point
==============================================================

                          Enter selection : 4
==============================================================

                     SET SNMP READ/WRITE COMMUNITY

    Format: The format for a community name is a string,
            consisting of 4 to 31 printable ASCII characters,
            that describes the relationship between an SNMP
            agent and one or more SNMP managers. The string
            defines the authentication mechanism that is employed
            to validate the use of the community by the sending
            SNMP entity.
==============================================================

      Enter the community string [public] : Accounting

      SNMP Read/Write community string set.

                     Press Return for Main Menu ...
```

RoamAbout Access Point INSTALLATION MENU

[5] Add SNMP Trap Addresses

This option prompts you to enter IP addresses to which SNMP traps are sent from the Access Point. A trap is a defined event or condition detected by the Access Point SNMP agent.

The following example shows the dialog associated with this option.

```
    RoamAbout Access Point
==========================================

                        Enter selection : 5
==========================================

                    ADD SNMP TRAP ADDRESSES
  Format: The standard 4 octet dotted decimal notation in which
          each octet of the address is represented as a decimal
          value, separated by a '.' character.
                    example: 16.20.54.156
==========================================

      Configured SNMP Trap Addresses: 16.20.216.81
                    Trap address [] : 16.20.54.156
      Trap address added!  Add another? [] :
                    Press Return for Main Menu ...
```

RoamAbout Access Point INSTALLATION MENU

[6] Delete SNMP Trap Addresses

This option prompts you to select SNMP trap addresses for deletion.

The following example shows the dialog associated with this option.

```
    RoamAbout Access Point
==========================================

                        Enter selection : 6
==========================================

                    DELETE SNMP TRAP ADDRESSES
  Format: The standard 4 octet dotted decimal notation in which
          each octet of the address is represented as a decimal
          value, separated by a '.' character.
                    example: 16.20.40.156
==========================================

      Configured SNMP Trap Addresses: 16.20.216.81
                    Trap address [] : 16.20.216.81
      Trap address deleted.  Delete another? [] :
                    Press Return for Main Menu ...
```

RoamAbout Access Point INSTALLATION MENU

[7] Dump Error Log

This option displays error log dumps used by Digital support personnel when analyzing system faults. Up to four error log dumps can be stored, and the most recent dump is displayed first.

The following example shows the dialog associated with this option.

```
   RoamAbout Access Point
==========================================

                        Enter selection : 7
==========================================

                            DUMP ERROR LOG
                        Current Reset Count:  31
==========================================

         Entry           = 24
         Time Stamp      = 0 0
         Reset Count     = 30
         3006 Unrecognized PCMCIA Card
      Dump another entry [Y]/N?
```

RoamAbout Access Point INSTALLATION MENU

[8] Set In-Band Interface IP Address

This option prompts you to enter the AP's IP address. If you want to perform SNMP management on the AP, you must assign it an IP address. If there is a BOOTP server on the network configured with the MAC address of the AP, the AP will get an IP address from it.

The following example shows the dialog associated with this option.

```
    RoamAbout Access Point
 ==========================================

                  Enter selection : 8
 ==========================================

                  IP ADDRESS CONFIGURATION
Format:  The standard 4 octet dotted decimal notation in which
         each octet of the address is represented as a decimal
         value, separated by a '.' character.
                    example: 16.20.40.156
         To delete the IP address, enter 0 in the appropriate address
         field.
 ==========================================

            IP address [16.20.216.179] : 16.20.54.156
            IP Address set

            Press Return for Main Menu ...
```

RoamAbout Access Point INSTALLATION MENU

[9] Set In-Band Interface Default Gateway Address

This option prompts you for a default gateway IP address. A default gateway address is needed only to deliver traps to a management station that is not on the local subnet.

Note

The module does *not* need to be configured with a default gateway for SNMP communications with a management station that is located on the local subnet in the IP network.

The following example shows the dialog associated with this option.

```
    RoamAbout Access Point
 ==========================================

                  Enter selection : 9
 ==========================================

          SET IN-BAND INTERFACE DEFAULT GATEWAY ADDRESS
Format:  The standard 4 octet dotted decimal notation in which
         each octet of the address is represented as a decimal
         value, separated by a '.' character.
                    example: 16.20.40.156
         To delete the IP address, enter 0 in the appropriate address
         field.
 ==========================================

          Default Gateway address [] : 16.20.80.156
                Default Gateway Address set

                      Press Return for Main Menu ...
```

RoamAbout Access Point INSTALLATION MENU
[10] Downline Upgrade

This option is not supported on the AP.

Note

To downline upgrade the AP software, you must select the Upgrade Flash option from the Module Specific Options (refer to Section 4.3.2).

RoamAbout Access Point INSTALLATION MENU
[11] Set Out–of–Band Management (OBM) Interface IP Address

This option is not applicable to the Access Point.

RoamAbout Access Point INSTALLATION MENU
[12] Set Out–of–Band Management (OBM) Port Speed

This option is not applicable to the Access Point.

RoamAbout Access Point INSTALLATION MENU

[13] Module-Specific Options

This option displays a submenu for performing management tasks that are specific to the AP. These management tasks include setting the wireless network and roaming parameters.

Note

This option appears as menu selection [11] when the AP is installed in the DEChub 900.

The following example shows the dialog associated with this option.

```
   RoamAbout Access Point
==========================================

            Installation – RoamAbout Access Point

               [1]  Enable/Disable Upline Dump
               [2]  Upgrade Flash
               [3]  Show Counters
               [4]  Dump Error Log
               [5]  Set Bridge Mode
               [6]  Show Wireless Configuration
               [7]  Set  Wireless Configuration
               [8]  Enable/Disable Default Rate Limiting

               [R]  Return to Main Menu

                     Enter selection : n
==========================================
```

A description of each menu option is described in Section 4.3.2.

4.3.2 Description of RoamAbout Access Point Module-Specific Options

This section describes the options that are available from the Access Point Installation Menu.

RoamAbout Access Point Module-Specific Options

[1] Enable/Disable Upline Dump

Option 1 allows you to specify whether the AP's memory is upline dumped in the event the AP crashes. This option invokes the following submenu:

The following example shows the dialog associated with this option.

```
   RoamAbout Access Point
==========================================

                        Enter Selection: 1
==========================================

                        Dump Mode Options

                        [1]  Enable Crash Dump

                        [2]  Disable Crash Dump
==========================================

                        Enter selection [2] :
```

When upline dump mode is enabled, the AP's memory is dumped to any local BOOTP load host that is configured with the AP's address. Upline dump mode is disabled by default.

RoamAbout Access Point Module-Specific Options

[2] Upgrade Flash

Option 2 allows you to upgrade the software in the AP's memory.

Note

Before using this option you must purchase an updated software license from Digital. Contact your Digital sales representative for details.

The following example shows the dialog associated with this option.

```
   RoamAbout Access Point
==========================================

                        Enter Selection: 2
==========================================

You have elected to upgrade the Access Point software.

   *** NOTE ***

** This option will stop current operation of the Access Point **
** and attempt to upgrade the software IMMEDIATELY.           **
==========================================

                    Press 'Y' to confirm [N] :
                    Press Return for Main Menu ...
```

When you invoke this option, the software in the AP's memory is immediately upgraded with an image downline loaded from the BOOTP server. Be sure to set up the BOOTP server prior to invoking this option.

RoamAbout Access Point Module-Specific Options

[3] Show Counters

Option 3 displays the values of all the counters maintained by the AP.

The following example shows the dialog associated with this option.

```
    RoamAbout Access Point
==========================================================

                        Enter Selection: 3
==========================================================

                    RoamAbout Access Point

 Device uptime:0 00:01:23          ETHERNET Port 0  WIRELESS Port 1
 Individually addressed bytes sent:              0           0
 Multicast bytes sent:                         154     1229580
 Individually addressed bytes received:    5386165           0
 Multicast bytes received:                 3366643           0
 Individually addressed frames sent:       2323134      233153
 Multicast frames sent:                          2        5285
 Individually addressed frames received:     22905           0
 Multicast frames received:                  17629           0
 Frames deferred:                                0           0
 Single collision:                               0           0
 Multiple collisions:                            0           0
 Excessive collisions:                           0           0
 Carrier check failed:                           0           0
 Transmit Frame too long:                        0           0
 Remote failure to defer:                        0           0
 Block check error:                              0           0
 Frame error:                                    0           0
 Receive Frame too long:                         0           0
 Data Overrun:                                   0           0
 System buffer unavailable:                      0           0
 Collision detect check failure:                 0           0
==========================================================

                    Press Return for Main Menu ...
```

RoamAbout Access Point Module-Specific Options

[4] Dump Error Log

Option 4 displays error logs maintained by the Access Point. This information is used by Digital support personnel when analyzing system faults. Up to four error log dumps can be stored, and the most recent dump is displayed first.

The following example shows the dialog associated with this option.

```
    RoamAbout Access Point
 ==========================================

                         Enter selection : 4
 ==========================================

 <Product Specific>  ERROR LOG
 ==========================================

 Entry Number  = 29
 Entry Type    = INFORMATIONAL ENTRY
 Error Code    = 00001600 Timeout waiting for BOOTP or TFTP reply
 Error Data    =
 0:0000001A    1:00000000     2:00000000      3:00000000
 4:00000000    5:00000000     6:00000000      7:00000001

Dump another Log entry [Y] /N ?

 Entry Number  = 27
 Entry Type    = DIAGNOSTIC ERROR
 Test ID       = 22
 Error Count   = 1
 Error Data    =
 0:00000001    1:FFFFFFFF     2:1C9E7AA8      3:00000000
 4:00000000    5:00000000     6:00000000      7:00000001

Dump another Log entry [Y] /N ?

           Press Return for Main Menu ...
```

RoamAbout Access Point Module-Specific Options

[5] Set Bridge Mode

Option 5 allows you to specify the bridge operating mode of the AP.

The default operating mode of the AP is Workgroup Bridge mode. If you change the bridge mode, you must select Option 2, `Reset with Current Settings`, from the Access Point installation menu (refer to Figure 4–3) to reset the AP with the new mode.

When the AP is operated in Workgroup Bridge mode, it learns only the addresses on the wireless side of the Ethernet LAN.

When the AP is operated in Full Bridge mode, it learns the addresses on both the wireless and wired sides of the Ethernet LAN.

Note

Full Bridge mode may not be supported by all PC Card Network Adapters. Refer to your PC Card Network Adapter documentation to determine if this feature is supported.

Refer to Section 1.5 for a detailed description of Workgroup Bridge mode and Full Bridge mode.

The following example shows the dialog associated with this option.

```
   RoamAbout Access Point
==========================================

                        Enter Selection: 5
==========================================

                        Bridge Mode Options

                        [1] Workgroup Bridge Mode

                        [2] Full Bridge Mode

                        *** NOTE ***
        You must Reset the System with Current Settings for
        the new configuration parameters to take effect.
==========================================

                        Enter selection [1] :
```

RoamAbout Access Point Module-Specific Options

[6] Show Wireless Configuration

Option 6 allows you to display the current settings of the wireless configuration parameters for your network adapter.

Option 6 displays either of two menus. When the AP is configured with a DS-type network adapter, the DS menu is displayed. When the AP is configured with a FH-type network adapter, the FH menu is displayed.

The following is an example of the display associated with this option for the 2.442 GHz DS-type network adapter:

Show Wireless Configuration – DS Network Adapter

```
    RoamAbout Access Point
==========================================

                        Enter Selection: 6
==========================================

       RoamAbout Access Point Wireless Configuration

         Current Network ID    : c00b
         Current Domain ID     : 0124
         Current Beacon Key    : 1234
         Current Station Name  : RoamAbout/WaveLAN
         Current Channel       : IEEE-2 (2.442 GHz)
         Current Encryption    : Disabled

      Roaming Threshold Parameters:
         Current Fast Cell Search Threshold     : 0018
         Current Regular Cell Search Threshold  : 0024
         Current Stop Cell Search Threshold     : 0030

                     Press Return for Main Menu ...
```

RoamAbout Access Point Module-Specific Options

[6] Show Wireless Configuration (Continued)

The following is an example of the display associated with this option for the FH-type network adapter:

Show Wireless Configuration – FH Network Adapter

```
    RoamAbout Access Point
==========================================

                        Enter Selection: 6
==========================================

           RoamAbout Access Point Wireless Configuration

         Station Type    : Master
         Channel         : 5
         SubChannel      : 1
         Domain          : 0
         This AP's Name  : DigitalMstr (00-20-A6-10-10-57)
         Current Master  : DigitalMstr (00-20-A6-10-10-57)

==========================================

                    Press Return for Main Menu ...
```

RoamAbout Access Point Module-Specific Options

[7] Set Wireless Configuration

Option 7 allows you to set the wireless configuration parameters for your Access Point.

Option 7 displays either of two menus. When the AP is configured with a DS-type network adapter, the DS menu is displayed. When the AP is configured with an FH-type network adapter, the FH menu is displayed.

The following is an example of the display associated with this option for DS-type network adapter.

Set Wireless Configuration – DS Network Adapter

```
    RoamAbout Access Point
═══════════════════════════════════════════

      RoamAbout Access Point Wireless Configuration

                [1]  Set Network ID
                [2]  Set Domain  ID
                [3]  Set Beacon  Key
                [4]  Set Roaming Threshold Parameters
                [5]  Reserved
                [6]  Reserved
                [7]  Set Channel
                [8]  Set Station Name

                [R]  Return to Module–Specific Options

═══════════════════════════════════════════

                      Enter selection : n
```

RoamAbout Access Point Module-Specific Options
[7] Set Wireless Configuration (Continued)

The following is an example of the display associated with this option for FH-type network adapter.

Descriptions of the FH menu options start on page 4–33.

Set Wireless Configuration – FH Network Adapter

```
    RoamAbout Access Point
═══════════════════════════════════════════════

        RoamAbout Access Point Wireless Configuration

                  [1]  Set Station Type
                  [2]  Set Channel
                  [3]  Set SubChannel
                  [4]  Set Domain
                  [5]  Set Master Name
                  [6]  Set Security ID

                  [R]  Return to Module–Specific Options

                  *** NOTE ***

      You must Reset the System with Current Settings for
      the new configuration parameters to take effect.
═══════════════════════════════════════════════
```

RoamAbout Access Point Module-Specific Options

[7] Set Wireless Configuration – DS Network Adapter

[1] Set Network ID

Option 1 allows you to set the wireless Network ID for your Access Point.

After you enter the new Network ID, you must select Option 2, `Reset with Current Settings`, from the RoamAbout Access Point Installation menu (refer to Figure 4–3) to reset the AP with the new Network ID.

Note

To ensure proper roaming, every AP in your wireless network must have a different Network ID.

If you are changing an existing Network ID, ensure that all the mobile end stations that communicate through the AP are notified that the wireless LAN will be temporarily disabled.

The following example shows the dialog associated with this option.

Set Network ID – DS Network Adapter

```
   RoamAbout Access Point
==========================================

                       Enter Selection: 1

==========================================

     SET NETWORK ID – RoamAbout Access Point

              *** NOTE ***
     You must Reset the System with Current Settings for
     the new configuration parameters to take effect.
        Last set to Network ID: FF10

==========================================

        Please enter the new Network ID [range 0100 – ffff]:
```

RoamAbout Access Point Module-Specific Options

[7] Set Wireless Configuration – DS Network Adapter

[2] Set Domain ID

Option 2 allows you to set the Domain ID for your Access Point.

The Domain ID and the Beacon Key (described later) provide a means of enabling an MES to roam from the coverage area of one AP into the coverage area of another AP, even though the Network IDs are different. When a MES roams into the area of another AP, the Domain ID and Beacon Key are checked to verify that they match the new area's Domain ID and Beacon Key.

To enable roaming, all APs and mobile end stations in your wireless network must be set to the same Domain ID and Beacon Key. (It is not necessary for the Domain ID and Beacon Key to match each other.) To disable roaming, set the Domain ID to 0.

After you enter the new Domain ID, you must select Option 2, `Reset with Current Settings`, from the RoamAbout Access Point Installation menu (refer to Figure 4–3) to reset the AP with the new Domain ID.

The following example shows the dialog associated with this option.

Set Domain ID – DS Network Adapter

```
    RoamAbout Access Point
==========================================

                        Enter Selection: 2

==========================================

         SET DOMAIN ID – RoamAbout Access Point


         Current Domain ID     : 0001

==========================================

         Please enter the new Domain ID [range 0000–ffff]: 0124
```

RoamAbout Access Point Module-Specific Options

[7] Set Wireless Configuration – DS Network Adapter

[3] Set Beacon Key

All APs (with roaming enabled) issue beacons containing a Domain ID and an encrypted Beacon Key that authorize a roaming MES to access the network. Option 3 allows you to set the Beacon Key for your Access Point.

To enable roaming, every MES and AP within your wireless network must have the same Domain ID and Beacon Key. (It is not necessary for the Domain ID and Beacon Key to match each other.) To disable roaming, set the Domain ID to 0, as described earlier.

The following example shows the dialog associated with this option.

Set Beacon Key – DS Network Adapter

```
    RoamAbout Access Point
═══════════════════════════════════════════

                        Enter Selection: 3

═══════════════════════════════════════════

         SET BEACON KEY – RoamAbout Access Point


         Current Beacon Key    : 0001
═══════════════════════════════════════════

      Please enter the new Beacon Key [range 0001 – ffff]: 1234
```

RoamAbout Access Point Module-Specific Options

[7] Set Wireless Configuration – DS Network Adapter

[4] Set Roaming Threshold Parameters

Option 4 allows you to set and display the AP's roaming parameters that control how a MES responds to a beacon transmitted by the AP.

Following are the default values for these roaming parameters:

- Fast Cell Search Threshold: 18
- Regular Cell Search Threshold: 24
- Stop Cell Search Threshold: 30

Digital recommends that you do not change these default values.

The following example shows the dialog associated with this option.

Set Roaming Threshold Parameters – DS Network Adapter

```
    RoamAbout Access Point
==========================================

                        Enter Selection: 4

==========================================

            Threshold Configuration – RoamAbout Access Point

            [1]  Set Fast Cell Search Threshold
            [2]  Set Regular Cell Search Threshold
            [3]  Set Stop Cell Search Threshold

            [R]  Return to Set Wireless Configuration Menu
==========================================

                        Enter selection :
```

RoamAbout Access Point Module-Specific Options

[7] Set Wireless Configuration – DS Network Adapter

[5] Reserved

Option 5 is reserved for future use.

RoamAbout Access Point Module-Specific Options

[7] Set Wireless Configuration – DS Network Adapter

[6] Reserved

Option 6 is reserved for future use.

RoamAbout Access Point Module-Specific Options

[7] Set Wireless Configuration – DS Network Adapter

[7] Set Channel (2.4GHz network adapter's only)

Option 7 allows you to set a channel for a 2.4GHz DS-type network adapter.

DS-type network adapters are available with different channel sets. The four channel sets are identified as FCC in North America; ETS in Europe and other countries; AU in Australia, which contains a subset of ETS channels; JP in Japan. The screen below shows the FCC channel set.

The following example shows the dialog associated with this option.

Set Channel (2.4GHz) – DS Network Adapter

```
    RoamAbout Access Point
==========================================

                  Enter Selection: 7

==========================================

  2.4GHz Channel Selection – RoamAbout Access Point

        [1] IEEE–2, (2.442GHz)
        [2] IEEE–3, (2.422GHz)
        [3] IEEE–4, (2.452GHz)
        [4] IEEE–5, (2.432GHz)
        [5] IEEE–6, (2.462GHz)
        [6] WLAN–A, (2.425GHz)
        [7] WLAN–B, (2.460GHz)
        [8] WLAN–D, (2.4305GHz)

        [R]  Return to Set Wireless Configuration Menu

      Last set to Channel: IEEE–2, (2.442GHz)

==========================================

                  Enter Selection: n
```

RoamAbout Access Point Module-Specific Options

[7] Set Wireless Configuration – DS Network Adapter

[8] Set Station Name (2.4GHz network adapter's only)

Option 8 allows you to set a station name when using a 2.4GHz DS-type network adapter.

The following example shows the dialog associated with this option.

Set Station Name – DS Network Adapter

```
    RoamAbout Access Point
 ═══════════════════════════════════════════

                  Enter Selection: 8

 ═══════════════════════════════════════════

   SET STATION NAME – RoamAbout Access Point

   Current Station Name  :  RoamAbout/DS

 ═══════════════════════════════════════════

Please enter the new Station Name (max 20 characters):
```

RoamAbout Access Point Module-Specific Options

[7] Set Wireless Configuration – FH Network Adapter

[1] Set Station Type

For most network operating systems, the network adapter in the AP should be the master. If an alternate master unit is unable to find a master within range, it acts as a master.

The following example shows the dialog associated with this option.

Set Station Type – FH Network Adapter

```
    RoamAbout Access Point
==========================================

                        Enter Selection: 1

==========================================

  Please enter Station Type (0–Station, 1–Alternate, 2–Master) [2]:

==========================================
```

RoamAbout Access Point Module-Specific Options

[7] Set Wireless Configuration – FH Network Adapter

[2] Set Channel

Each master can select one of 15 channels to establish communications with stations. Each channel provides 1.6 Mbps for a maximum bandwidth of 24 Mbps. For networks with multiple masters, set each master to a different channel.

The following example shows the dialog associated with this option.

Set Channel – FH Network Adapter

```
    RoamAbout Access Point
==============================================

                        Enter Selection: 2

==============================================

  Please enter the new Channel (range 1 – 15; 'A' – Autoselect) [A]:

==============================================
```

RoamAbout Access Point Module-Specific Options
[7] Set Wireless Configuration – FH Network Adapter
[3] Set SubChannel

If you need more than 15 masters in the same area, you can change the subchannel to differentiate the networks.

The following example shows the dialog associated with this option.

Set SubChannel – FH Network Adapter

```
    RoamAbout Access Point
==============================================

                        Enter Selection: 3

==============================================

  Please enter the new SubChannel (range 1 – 15) [1]:

==============================================
```

RoamAbout Access Point Module-Specific Options

[7] Set Wireless Configuration – FH Network Adapter

[4] Set Domain

To successfully communicate, all station types must have the same domain number and security ID. For larger wireless networks, use the domain to establish roaming subnetworks. Only clients with the same domain can roam from one access point to another.

After you enter the new Domain number, you must select Option 2, `Reset with Current Settings`, from the RoamAbout Access Point Installation menu (refer to Figure 4–3) to reset the AP with the new Domain number.

The following example shows the dialog associated with this option.

Set Domain – FH Network Adapter

```
   RoamAbout Access Point
==========================================

                        Enter Selection: 4

==========================================

  Please enter the new Domain (range 0 – 15) [0]:

==========================================
```

RoamAbout Access Point Module-Specific Options
[7] Set Wireless Configuration – FH Network Adapter
[5] Set Master Name

This optional parameter specifies an alphanumeric name (up to 11 characters) to simplify the identification of each master in the network.

The following example shows the dialog associated with this option.

Set Master Name – FH Network Adapter

```
    RoamAbout Access Point
==============================================

                        Enter Selection: 5

==============================================

  Please complete the Master Name (1 – 11 characters) [DigitalMstr]:

==============================================
```

RoamAbout Access Point Module-Specific Options

[7] Set Wireless Configuration – FH Network Adapter

[6] Set Security ID

To increase security of a wireless network, you can require all stations to have the same security ID. If the security IDs of a master and a station do not match, no communication is possible between them.

The following example shows the dialog associated with this option.

Set Security ID – FH Network Adapter

```
    RoamAbout Access Point
==========================================

                        Enter Selection: 6

==========================================

Please enter new Security ID (1–20 characters; 0=default Security ID
[]:

==========================================
```

RoamAbout Access Point Module-Specific Options

[8] Enable/Disable Default Rate Limiting

Option 8 allows you to enable and disable default rate limiting for your Access Point. When enabled, the AP specifies the rate (frames/sec) at which the bridge forwards multicast frames.

Default rate limiting can be put into effect when no other protocol or address-based rate limiting is in effect.

When you enable default rate limiting and multicast traffic is received at the wired port, the default forwarding rate is 100Kbps for DS-type PC Cards and 27 pps for FH-type PC Cards.

The following example shows the dialog associated with this option.

```
    RoamAbout Access Point
═══════════════════════════════════════

                      Default Rate Limiting


                      [1]  Enable

                      [2]  Disable

                      Enter selection [1]:
═══════════════════════════════════════
```

5

Problem Solving

This chapter contains problem solving information for the Access Point. Refer to the appropriate section for information about solving specific problems.

5.1 Basic Problem Solving

The LEDs on the Access Point (AP) show the status of the unit and help you diagnose problems. After the AP is powered up and completes its power-up self-test procedure, the LEDs indicate whether the unit is functioning properly.

When the power-up self-test diagnostics detect a failure in the AP or you suspect a failure, rerun the self-test to verify that the failure can be repeated. Run the self-test by unplugging the ac power cord and plugging it back in.

5.1.1 Using the LEDs to Help Determine a Problem

Table 5–1 summarizes the Access Point LEDs.

Table 5–1 LED Summary Table

LED No.	LED Color	LED Signal	LED On Status	Normal State
1	Green	Power OK	Power is on.	On
2	Green	Module OK	Software is running OK.	On
3	Green	Wired LAN Activity	Indicates activity on wired LAN.	Blinking
4	Green	Bridge State	Indicates AP is forwarding.	On
5	Yellow	AP Saturated	Indicates that packets are being lost due to congestion, or an error condition exists (see Table 5–2).	Off
6	Green	Wireless LAN Activity	Indicates activity on wireless LAN.	Blinking
7	Green	PC Card Present	A network adapter is present in the unit.	On

Note

LEDS that blink do so in one of two modes:

- Normal mode – At a variable (random) rate with varied intensity to indicate the activity level during normal operation.
- Error mode – At a constant (steady) rate and intensity (for example: ON, OFF, ON, OFF, ON, OFF . . .) to indicate an error.

Table 5–2 describes possible Access Point problems and recommended corrective actions.

Table 5–2 LED Problem Solving Summary

If...	Then...	Do This...
Power OK LED (1) is off.	AP does not have power.	Verify that the outlet has power. Check the power connection to the AP. Replace the power supply. Return the unit to Digital Equipment Corporation.
Module OK LED (2) is off.	Either the module is performing hardware diagnostics, the Ethernet connection is bad, or the AP hardware is defective.	Verify the Ethernet connection. If the LED still fails to light, return the unit to Digital Equipment Corporation.
Module OK LED (2) is blinking in Error mode (constant rate and intensity), *and* is is blinking in unison with the AP Saturated LED *and* in unison with either the Wired LAN or Wireless LAN activity LED.	The AP is not connected to either the wired LAN or wireless LAN.	Check to see which network activity LED the Module OK LED is blinking in unison with, and verify the appropriate connection.
Wired LAN Activity LED (3) is blinking with a short on once per second.	AP is not connected to the wired network, or there is no activity on the wired LAN.	Verify that the AP is physically connected to the network.
AP Saturated LED (5) is blinking in Normal mode.	AP is dropping packets due to excessive traffic.	Examine your configuration to determine if there are one or more users transmitting excessive amounts of data.

(continued on next page)

Table 5–2 LED Problem Solving Summary (Cont.)

If...	Then...	Do This...
AP Saturated LED (5) is blinking in Error mode.	This indicates an error condition exists.	See Module OK LED description.
Wireless LAN Activity LED (6) is blinking a short on once per second.	There is no activity on the wireless LAN. If you know there is activity on the wireless LAN, then this status indicates that the PC Card has an incorrect wireless parameter or is not operating properly.	Reconfigure the wireless parameters. Ensure that the AP and all mobile end stations in the AP's coverage area have the same wireless parameters. Verify that the PC Card is installed properly.
Bridge State LED (4) is on.	Self-test in progress, or a spanning tree reconfiguration is underway. Otherwise, this status may indicate that there is a redundant AP handling the network traffic and that this AP is in Standby mode.	Wait until self-test or reconfiguration ends. If the AP is in Standby mode, verify your network configuration to determine whether there is another AP configured to operate in the same coverage area.
Bridge State LED (4) is blinking.	Downline load is in progress.	Wait for downline load to complete.
PC Card Present LED (7) is off.	There is no PC Card installed in the slot, or it is not properly inserted.	Turn off power and insert the PC Card into the AP.

Tables 5–3 through 5–5 list common conditions and the corresponding states of the LED indicators.

Table 5–3 Normal Operating Mode LED Patterns

LEDs[1] 1	2	3	4	5	6	7	Meaning of LED Pattern
●	●	⊕	●	◔	⊕	●	Normal operating mode.
●	●	⊕	◔	◔	⊕	●	AP is okay but waiting for Spanning Tree.
●	●	⊕	●	⊕	⊕	●	AP is okay but occasionally saturated.
●	◍	⊕	◔	◍	◍	●	PC Card is defective or the radio module is not connected to the PC Card.
●	◍	◍	◔	◍	⊕	●	Ethernet problem after power-up.

[1] ● = on, ◔ = off, ◍ = steady blinking, ⊕ = random blinking

Table 5–4 Diagnostics LED Patterns

LEDs[1] 1	2	3	4	5	6	7	Meaning of LED Pattern
◔	◔	◔	◔	◔	◔	◔	No power; failed power supply; no power at outlet.
●	⁂	⁂	⁂	⁂	⁂	◔	PC Card not inserted properly.
●	◔	◔	◔	●	●	⁂	Diagnostics still running.
●	◔	◔	◍	◍	◍	⁂	Ethernet connection broken.
●	◔	◔	◔	◍	◔	⁂	Failure while initializing/testing the memory.

[1] ● = on, ◔ = off, ◍ = steady blinking, ⊕ = random blinking, ⁂ = any state

Table 5–5 Network Loading/Upline Dumping LED Patterns

LEDs[1] 1	2	3	4	5	6	7	Meaning of LED Pattern
●	●	◔	⊕	◔	●	⁂	Waiting for downline load from load host
●	●	⊕	⊕	◔	●	⁂	Downline loading image from load host
●	●	⊕	⊕	◔	◔	⁂	Software error detected while downline loading image from load host
●	●	⊕	⊕	◔	⊕	⁂	TFTP file not found
●	●	◔	◔	◔	◔	⁂	Waiting for retry of TFTP load
●	●	◔	●	●	●	⁂	Upgrading Flash
●	●	◔	◍	◍	●	⁂	Flash upgrade successful
●	◔	◍	◔	◔	●	⁂	Invalid (wrong) load image
●	◔	◔	◍	◔	●	⁂	Unsuccessful Flash upgrade
●	◔	◔	◔	◍	●	⁂	Invalid load image: corrupted image
●	◔	◍	◍	◔	●	⁂	Invalid load image: image too large
●	◔	◍	◔	◍	●	⁂	TFTP error
●	◔	◍	◍	◍	●	⁂	Software error or number of retries exceeded
●	◔	◍	◍	◍	◍	⁂	Hardware error

[1] ● = on, ◔ = off, ◍ = steady blinking, ⊕ = random blinking, ⁂ = any state

5.1.2 Access Point Reset Button

You can force a downline load of the AP's software from a load host and reset to factory parameters by pressing the `Reset` button on the front panel of the AP during a power-up cycle. When you press the `Reset` button (as the unit is powering up), the LEDs cycle through three times to indicate that the AP recognized the reset request. If the LEDs do not function properly after resetting the AP to its factory settings, remove the AP and return it to Digital Equipment Corporation.

A

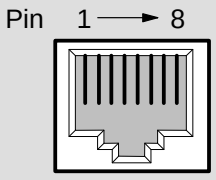
Connector, Cable, and Adapter Pin Assignments

Overview

This appendix lists the connector, adapter, and cable pin assignments for the Digital RoamAbout Access Point. Figure A–1 illustrates the 10BaseT connector pin and signal assignment. Figure A–2 illustrates the setup port connector pin and signal assignment. Figure A–3 and Figure A–4 illustrate the pin assignments for the cables associated with the setup port. Figure A–5 and Figure A–6 illustrate the pin and signal assignment for the adapters associated with the setup port.

Figure A–1 10BaseT (8-pin MJ) Connector Pin Assignments

Pin	Assignment
1	No connect
2	Receive (RX)
3	Ground
4	No connect
5	No connect
6	Transmit (TX)
7	Data Terminal Ready-(DTR)
8	Data Set Ready-(DSR)

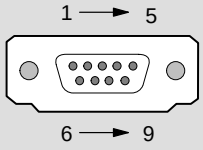


8-pin MJ connector

LKG-8995-93I

Figure A–2 Setup Port (DB-9) Connector Pin Assignments

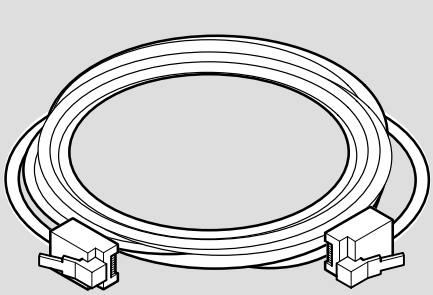
Pin	Assignment
1	Data Carrier Detect (DCD)
2	Receive Data (RXD)
3	Transmit Data (TXD)
4	Data Terminal Ready (DTR)
5	Ground
6	Data Set Ready (DSR)
7	Request to Send (RTS)
8	Clear to Send (CTS)
9	No connect

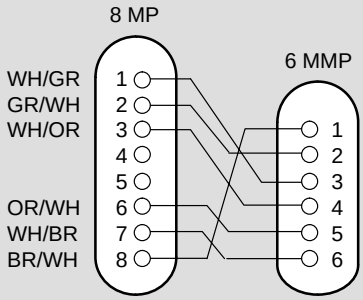


DB9 9-pin connector

LKG-8996-93I

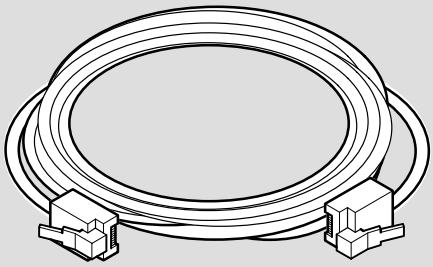
Figure A–3 BN24H Cable Pin Assignments

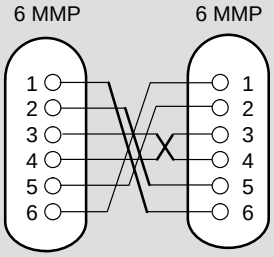




LKG-4716-91I

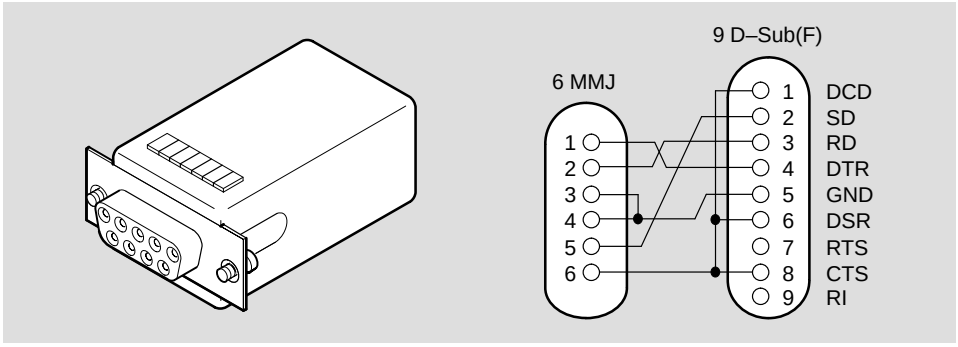
Figure A–4 BC16E Cable Pin Assignments





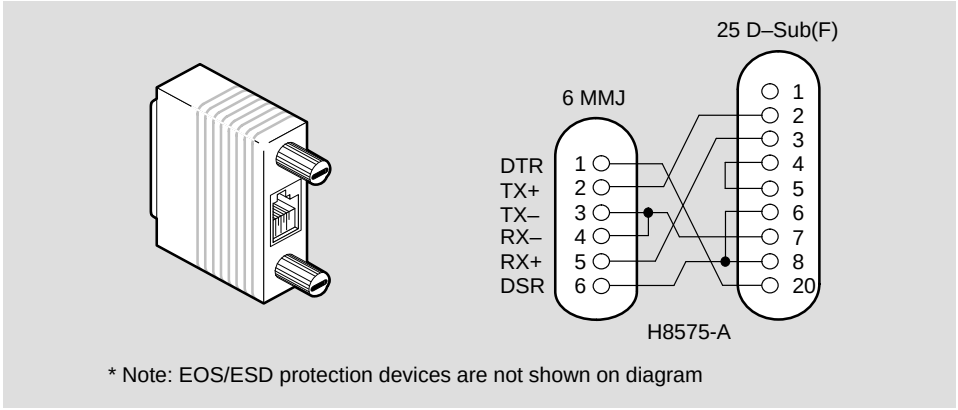
LKG-4718-91I

Figure A–5 H8571-J Adapter Pin Assignments



LKG-5342-91I

Figure A–6 H8575-A Adapter Pin Assignments



LKG–8793–93I

B

Accessing Online Information

This appendix describes how to access this product's online release notes, public MIBs, Digital's private MIBs, and requests for comments (RFCs).

You can access this information from Digital's Internet ftp server at: `ftp.digital.com (16.1.0.2).`

To Access...	Use...
MIBs, release notes, and the Load utility	Anonymous ftp
MIBs and release notes	ftpmail
RFCs	Electronic mail

Using Anonymous ftp

You can access any of Digital RoamAbout Access Point MIBs, release notes, and Load Utility over the Internet by using FTP.

When you use FTP, you must include the following parameters:

- connect to `ftp.digital.com`
- for a user name, enter `anonymous`
- for a password, enter your Internet mail address, for example: `name@system.company.com`
- change directory to: `/pub/DEC/<directory_name>` (Refer to Table B–1 for a list of directory names.)

Table B–1 Directory Names Available

Directory Name	Contents[1]
RoamAbout	RoamAbout-specific MIBs, release notes and README files
hub900/mibs	common MIBs

[1] Digital suggests reading the README file in each directory to understand the contents of that directory.

You can also access these directories from the World Wide Web using a browser. The Universal Resource Locator (URL) is:
`file://ftp.digital.com/pub/DEC/<directory_name>/`

The following example shows how to copy a README file. User input in the example is shown in **bold** text.

NOTE: User input is case-sensitive; you must type it as shown.

```
% ftp ftp.digital.com
Connected to ftp.digital.com
220 FTP.DIGITAL.COM FTP Service Process
Name: anonymous
331 ANONYMOUS user ok, send real ident as password.
Password: milano@netman.stateu.edu
230 User ANONYMOUS logged in at Tue 10-May-1994 10:24-EST,
job 54.
ftp> cd /pub/DEC/<directory_name>
```
(Refer to Table B–1 for directory names.)
```
331 Default name accepted. Send password to connect to it.
ftp> ascii
```
(see note below)
```
220 Type A ok.
ftp> get README
200 Port 19.54 at host nnn.nn.nn.nn accepted.
150 ASCII retrieve of /pub/DEC/RoamAbout/README started.
226 Transfer completed. 40239 (8) bytes transferred.
40239 bytes received in 23.65 seconds (5.8 Kbytes/s)
ftp> quit
%
```

NOTE: To transfer binary files, replace the `ascii` command shown in this example with `binary` or `image`.

Using ftpmail

Digital offers Internet ftpmail access to private MIB and release note information, in ASCII text form, at ftp.digital.com, with up-to-date documents stored in:
`/pub/DEC/<directory_name>` (Refer to Table B–1 for a list of directory names.)

To use ftpmail, follow these instructions:

1. Send a mail message to `ftpmail@ftp.digital.com`.
2. Ignore the subject line.
3. Include the word `connect` in the first line of the body.
4. Include `get` commands for each document required, for example:
   `get /pub/DEC/<directory_name>/README`
   (Refer to Table B–1 for a list of directory names.)
5. `quit`

Requests are acknowledged, then queued and processed every 30 minutes. Because of the number of requests, it may take a day or two before you receive a reply.

NOTE: For more timely access, consider using anonymous ftp (refer to the section titled Using Anonymous ftp).

Using Electronic Mail

You can obtain RFC's by using electronic mail. The DDN Network Information Center (NIC) of SRI International provides automated access to NIC documents and information through electronic mail. This is especially useful for people who do not have access to the NIC from a direct Internet link, such as BITNET, CSNET, or UUCP sites.

To use the mail service, follow these instructions:

1. Send a mail message to `SERVICE@NIC.DDN.MIL.`
2. In the `SUBJECT` field, request the type of service that you want, followed by any needed arguments.

Normally the message body is ignored, but if the `SUBJECT` field is empty, the first line of the message body is taken as the request.

The following are example `SUBJECT` lines to obtain `DDN NIC` documents:

```
HELP
RFC 822
RFC INDEX
RFC 1119.PS
FYI 1
IETF 1IETF–DESCRIPTION.TXT
INTERNET–DRAFTS 1ID–ABSTRACTS.TXT
NETINFO DOMAIN–TEMPLATE.TXT
SEND RFC: RFC–BY–AUTHOR.TXT
SEND IETF/1WG–SUMMARY.TXT
SEND INTERNET–DRAFTS/DRAFT–IETF–NETDATA–NETDATA–00.TXT
HOST DIIS
```

Requests are processed automatically once a day. Large files are broken down into separate messages.

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